IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF TEXAS
HOUSTON DIVISION

EXXON MOBIL CORPORATION, Plaintiff,	)	
v.	)	Civil Action Nos. H-10-2386 (LHR) H-11-1814 (LHR)
UNITED STATES OF AMERICA, Defendant.	)	

PLAINTIFF'S PROPOSED FINDINGS OF UNDISPUTED MATERIAL FACTS

Daniel M. Steinway (S.D. Tex. No. 1105349) - Attorney in Charge
Tynan Buthod (S.D. Tex. No. 14036)
Michael McGovern (S.D. Tex. No. 1095459)
BAKER BOTTS L.L.P.
One Shell Plaza
910 Louisiana
Houston, TX 77002-1234
Tel.: (202) 639-7700
Fax: (202) 639-7980
daniel.steinway@bakerbotts.com

Counsel for Plaintiff Exxon Mobil Corporation

December 15, 2017

TABLE OF CONTENTS

FIGURE LIST

Figure #	**Document Name**	**Short Citation (citation used in text)**
1	Baytown Aerial Photo (1967) with Cleanup Units Identified	Baytown Map
2	Baton Rouge Aerial Photo (2010) with Cleanup Units Identified	Baton Rouge Map
3	Breakdown of Documentation Availability by Site	Cost Documentation Chart
4	Major War Products Process Unit Block Flow Diagram for Baton Rouge Refinery	Baton Rouge War Products Flow Diagram

TABLE LIST

Table #	Document Name	Short Citation (citation used in text)
15	Production-Based Allocation Adjustments to Reflect Process and Waste Management Control Improvements at both the Baytown and Baton Rouge Facilities	Waste Processing Improvement Allocation Adjustments

EXHIBIT LIST

Ex. #	Att. #	Document Name	Short Citation (citation used in text)
1		Declaration of Richard L. White	White Decl.
1	A	Resume	Resume
1	B	Expert Report of Richard L. White (June 2012)	White 2012 Rpt.
1	C	Supplemental Expert Report of Richard L. White (Jan. 2017)	White 2017 Supp. Rpt.
1	D	Expert Rebuttal Report of Richard L. White (Dec. 2012)	White 2012 Rebuttal Rpt.
2		Declaration of Gregory G. Kipp	Kipp Decl.
2	A	Resume	Resume
2	B	Expert Report of Gregory G. Kipp (June 2016)	Kipp 2016 Rpt.
2	C	Supplemental Expert Report of Gregory G. Kipp (Dec. 2016)	Kipp 2016 Supp. Rpt.
3		Declaration of Paul S. Ficca	Ficca Decl.
3	A	Resume	Resume
3	B	Expert Report of Paul S. Ficca (June 2016)	Ficca 2016 Rpt.
3	C	Expert Rebuttal Report of Paul S. Ficca (Sept. 2016)	Ficca 2016 Rebuttal Rpt.

Ex. #	Att. #	Document Name	Short Citation (citation used in text)
3	D	Supplemental Expert Report of Paul S. Ficca (Jan. 2017)	Ficca 2017 Supp. Rpt.
4		Declaration of Stephen Johnson	S. Johnson Decl.
4	A	Resume	Resume
4	B	Expert Report of Stephen Johnson (Nov. 2014)	S. Johnson 2014 Rpt.
4	C	Expert Report of Stephen Johnson (May 2016)	S. Johnson 2016 Rpt.
4	D	Expert Rebuttal Report of Stephen Johnson (Mar. 2017)	S. Johnson 2017 Rebuttal Rpt.
5		Declaration of John M. Beath	Beath Decl.
5	A	Resume	Resume
5	B	Rebuttal Expert Report of John Beath (Dec. 2012)	Beath 2012 Rebuttal Rpt.
5	C	Supplemental Expert Report of John M. Beath (Nov. 2014)	Beath 2014 Supp. Rpt.
6		Declaration of A.J. Gravel	Gravel Decl.
6	A	Resume	Resume
6	B	Expert Report of A.J. Gravel (June 2012)	Gravel 2012 Rpt.
6	C	Expert Rebuttal Report of A.J. Gravel (Dec. 2012)	Gravel 2012 Rebuttal Rpt.
6	D	Supplemental Expert Report of A.J. Gravel (Nov. 2014)	Gravel 2014 Supp. Rpt.
7		Declaration of Wayne Grip	Grip Decl.
7	A	Resume	Resume
7	B	Expert Rebuttal Report of Wayne Grip (Dec. 2012)	Grip 2012 Rebuttal Rpt.
8		Declaration of Jere M. Johnson	J. Johnson Decl.

Ex. #	Att. #	Document Name	Short Citation (citation used in text)
8	A	Resume	Resume
8	B	Expert Report of Jere M. Johnson (June 2012)	J. Johnson 2012 Rpt.
8	C	Expert Rebuttal Report of Jere M. Johnson (Dec. 2012)	J. Johnson 2012 Rebuttal Rpt.
9		Declaration of David M. Lerman	Lerman Decl.
9	A	Resume	Resume
9	B	Expert Report of David M. Lerman (Sept. 2015)	Lerman 2015 Rpt.
10		Declaration of Leon Paredes	Paredes Decl.
11		Declaration of Peter Gagnon	Gagnon Decl.
11	A	Resume	Resume
11	B	Expert Rebuttal Report of Peter Gagnon (Dec. 2012)	Gagnon 2012 Rebuttal Rpt.
12		Declaration of Michael Pisani	Pisani Decl.
13		National Oil and Hazardous Substances Contingency Plan, 47 Fed. Reg. 31,180 (July 16, 1982)	1982 NCP
14		National Oil and Hazardous Substances Pollution Contingency Plan, 50 Fed. Reg. 47,912 (Nov. 20, 1985)	1985 NCP
15		Memorandum from Stephen Luftig, Director, EPA Office of Emergency and Remedial Response to EPA Regions I-X, Use of Non-Time Critical Removal Authority in Superfund Response Actions (Feb. 14, 2000)	EPA Removal Guidance
16		United States' summary judgment brief in the case of *United States v. Mountain Metals Co.* (N.D. Ala. filed June 13, 2000)	U.S. *Mountain Metals* SJ Brief
17		Memorandum from Steven A. Herman, Assistant Administrator, EPA Office of Enforcement and Compliance Assurance, and Elliott P. Laws,	RCRA-CERCLA Parity Guidance

Ex. #	**Att. #**	**Document Name**	**Short Citation (citation used in text)**
		Assistant Administrator, EPA Office of Solid Waste and Emergency Response to EPA Regions I-X, Coordination between RCRA Corrective Action and Closure and CERCLA Site Activities (Sept. 24, 1996)	
18		Expert Rebuttal Report of Alborz A. Wozniak (Feb. 2017)	Wozniak 2017 Rpt.
19		Expert Report of James R. Kittrell, Ph.D. (Sept. 2016)	Kittrell 2016 Rpt.
20		Expert Rebuttal Report of James R. Kittrell, Ph.D. (Jan. 2017)	Kittrell 2017 Rebuttal Rpt.

Pursuant to Rule 56 of the Federal Rules of Civil Procedure, Plaintiff Exxon Mobil Corporation ("Exxon") respectfully submits the following proposed findings of undisputed material facts in support of its motion for partial summary judgment as to Phase 2 issues. Each proposed finding ("PF") is supported by an exhibit and/or one or more historical documents, and at the end of each proposed finding the exhibit is identified and/or the location of the historical documents in the Appendix are specified.

I. <u>The Baytown and Baton Rouge Sites</u>

1. Exxon currently owns and operates an oil refinery and chemical plant in Baytown, Texas which is located 25 miles east of Houston. The refinery and chemical plant is adjacent to several surface water bodies, including the Houston Ship Channel, Black Duck Bay, Mitchell Bay and Scott's Bay (collectively, the Baytown refinery and chemical plant and these adjacent surface water bodies is referred to as the "Baytown Facility" or "Baytown Site"). Compl. ¶ 10 (Civ. A. No. H-10-2386); Ex. 6, Att. B, Gravel 2012 Rpt. at 41 (Figure 4).

2. The Baytown Facility commenced operations as an oil refinery ("Baytown refinery") in approximately 1920, and at that time Humble Oil & Refining Company ("Humble")—one of Exxon's predecessor companies—owned and operated the refinery. A000001–A000005.

3. The Baytown Facility remained an oil refinery until the early 1940s when the complex expanded into a much larger manufacturing facility for the production of war products, particularly 100-octane aviation gasoline ("avgas"), toluene and synthetic rubber. *See* PF ¶¶ 134–73 (Government plants at Baytown); Ex. 6, Att. B, Gravel 2012 Rpt. at 86 (Table 2 lists refinery conversions, expansions and new construction during World War II ("WWII"), not including Government plants).

4. Table 1 below lists the process units and related facilities that were either converted, newly constructed or expanded in order to increase the production of avgas and/or other war products at the Baytown Facility during the late 1930s to early 1940s period.

TABLE 1 – Baytown Facility[1]

Process Unit or Related Facilities	War-Related Purpose	Date Competed
Di-Isobutylene[2]	Converted to Avgas Production	August 1935
Co-polymer	Converted to Avgas Production	November 1937
Codimer	Converted to Avgas Production	February 1938
Alkylation Plant[3]	Converted to Avgas Production	September 1938
Thermal cracking coils	Converted to Avgas Production	Exact Date Unknown (EDU")
Debutanizing and Stabilizing	Converted to Avgas Production	EDU
Gas Absorption	Converted to Avgas Production	EDU
Naphtha Rerunning	Converted to Avgas Production	EDU
Acid Treating	Converted to Avgas Production	EDU
Finishing	Converted to Avgas Production	EDU
Baytown Ordnance Works ("BOW")[4]	New Unit; Increased Toluene Production	September 1941
Catalytic cracking #1	New Unit; Increased Avgas Production	November 1942
Superfractionation	New Unit; Increased Avgas Production	November 1942
Isomerization	New Unit; Increased Avgas Production	November 1942
Superfractionation	New Unit; Increased Avgas Production	May 1943
Isomerization	New Unit; Increased Avgas Production	May 1943
Butadiene Plancor 485[5]	New Unit; Increased Butadiene Production	August 1943
Catalytic cracking #2	New Unit; Increased Avgas Production	February 1944
Butyl Rubber Plancor 1082[6]	New Unit; Increased Butyl Rubber Prod.	February 1944
Hydrocodimer Plancor 1909[7]	New Unit; Increased Avgas Comp. Prod.	August 1944
Isobutane	Expanded Avgas Production	August 1943
Hydroformed Naphtha	Expanded Toluene Production	August 1943
BOW Hydroformate By-Products	Expanded Avgas Production	
Replace Vapor Line on FCCU #1	Expanded Avgas Production	August 1943
Remodel thermal crackers	Expanded Toluene Production	August 1943
Remodel cooling towers	Expanded Avgas Production	August 1943*
Catalyst Recovery	Expanded Avgas Production	January 1944*
Change Isomerization Unit	Expanded Avgas Production	August 1943
Pentylene Recovery	Expanded Avgas Production	August 1943
Additional Loading Facilities	Expanded Avgas Production	November 1943*
Improved Heat Exchanger	Expanded Avgas Production	January 1944*
Additional Cooling Tower	Expanded Avgas Production	April 1944*
Additional Storage of Isobutane	Supported Avgas Production	January 1944*
Addit. Piping for Naphthenic Crude Segregation	Expanded Avgas Production	December 1943*
Expand Isomerization Unit	Expanded Avgas Production	February 1944*
Expand Xylene Production	Expanded Avgas Production	February 1944*

*Scheduled completion date

1 A000381; A002886; A003100; A010313.
2 A003112.
3 A003112.
4 A002035–A002074.
5 A003127.
6 A003133.
7 A003175.

5. Exxon currently owns and operates an oil refinery and chemical plant in Baton Rouge, Louisiana. The Baton Rouge refinery and chemical plant is adjacent to the Mississippi River and Monte Sano Bayou (collectively, the refinery and chemical plant and these adjacent surface water bodies is referred to as the "Baton Rouge Facility" or "Baton Rouge Site"). Complaint at ¶ 10 (Civ. A. No. H-11-1814); Ex. 6, Att. B, Gravel 2012 Rpt. at 138 (Figure 31).

6. The Baton Rouge Facility commenced operations as an oil refinery ("Baton Rouge refinery") in approximately 1909, and at that time Standard Oil of Louisiana ("Standard Oil")—one of Exxon's predecessor companies—owned and operated the refinery. Complaint at ¶ 11 (Civ. A. No. H-11-1814).

7. The Baton Rouge Facility remained an oil refinery until the early 1940s when the complex expanded into a much larger manufacturing facility for the production of war products, particularly avgas and synthetic rubber. *See* PF ¶¶ 174–201 (Government plants); Ex. 6, Att. B, Gravel 2012 Rpt. at 183 (Table 4 lists refinery conversions, expansions and new construction during WWII, not including Government plants).

8. Table 2 below lists the process units and related facilities that were either converted, newly constructed or expanded in order to increase the production of avgas and/or other war products at the Baton Rouge Facility during the late 1930s to early 1940s period.

TABLE 2 – Baton Rouge Facility[8]

Process Unit or Related Facilities	War-Related Purpose	Date Competed
Pipe Still No. 1 – Crude oil distillation	Converted to Avgas Production	1931
Pipe Still No. 2 – Crude oil distillation	Converted to Avgas Production	1931
Lube Oil Treating	Converted to War Production	1934
Catalytic Hydrogeneration Plant[9]	Converted to Avgas Production	June 1937
Copolymer Plant – di-isobutylene[10]	Converted to Avgas Production	1938
Propane DeWaxing	Converted to War Production	1938
Butadiene Conversion Plancor 1355	Converted to War Production	March 1943
Alkylation Plant #1	New Unit; Increased Avgas Production	July 11, 1940
Depropanizer #1	New Unit; Increased Avgas Production	July 11, 1940
Depropanizer #5 (Hydro)	New Unit; Increased Avgas Production	1940
Catalytic Cracking Unit 1	New Unit; Increased Avgas Production	May 25, 1942
Cumene Plant (UOP Poly Plant)	New Unit; Increased Avgas Production	September 18, 1942
Depropanizer #2	New Unit; Increased Avgas Production	November 20, 1942
Catalytic Light Ends Unit 2-West	New Unit; Increased Avgas Production	1942
Butyl Rubber Plancor 572[11]	New Unit; Increased Butyl Rubber Prod.	December 1942
Depropanizer #3	New Unit; Increased Avgas Production	January 15, 1943
Alkyation Plant #2	New Unit; Increased Avgas Production	January 15, 1943
Alkylation Plant #3	New Unit: Increased Avgas Production	January 15, 1943
Pipe Still No. 7 – Crude oil distillation	New Unit; Increased Avgas Production	March 20, 1943
Butadiene Plancor 152[12]	New Unit; Increased Butadiene Production	May 1943
Catalytic Cracking Unit 3	New Unit; Increased Avgas Production	June 25, 1943
Catalytic Cracking Unit 2	New Unit; Increased Avgas Production	September 20, 1943
Catalyst Plancor 1526[13]	New Unit; Increased Catalyst Production	December 1943
Hydrogenation Plancor 1868[14]	New Unit; Increased Avgas Production	December 5, 1943
Catalytic Light Ends Unit 1-West	New Unit; Increased Avgas Production	1943
Catalytic Light Ends Unit 2-East	New Unit; Increased Avgas Production	1943
C-S Rerun	New Unit; Increased Avgas Production	January 6, 1944
Avgas Blending Components Plancor 1065[15]	New Unit; Increased Avgas Production	April 30, 1944
Butane Isomerization	New Unit; Increased Avgas Production	April 1944

II. Government Authorities/Controls During WWII

A. General Governmental Controls

9. During World War I, the U.S. Congress enacted the National Defense Act of 1916, Pub. L. No. 64-85, §120, 39 Stat. 166, 213 (1916), which remained in effect during WWII, and Section 120 of this Act authorized the President "in time of war or when war is imminent, . . . in addition to the present authorized methods of purchase or procurement, to place an order with any [supplier] for such product or material as may be required." A000055. This authority included the power to seize plants that did not comply with production orders,

8 A002580–A002586. Unless otherwise indicated, information for Table 4 was drawn from these sources.
9 A010310.
10 A010311.
11 A003209.
12 A001599.
13 A003226.
14 A001955–A001958
15 A001937.

and to enforce production under threat of criminal penalties, but also required that "compensation to be paid to any [private entity] for its products or material . . . be fair and just." A000055.

10. On September 8, 1939, following Nazi Germany's attack on Poland, President Franklin D. Roosevelt declared a state of limited national emergency. A000006.

11. In June 1940, Congress enacted the Selective Training and Service Act of 1940 ("Selective Service Act"), Pub. L. No. 76-783, § 9, 54 Stat. 885 (1940), to further supplement the President's war procurement authorities, and Section 9 of the Selective Service Act granted the President the authority to "take immediate possession of any such plant or plants, and through the appropriate branch, bureau, or department of the Army or Navy to manufacture therein such product or material as may be required, and any individual, firm, company, association, or corporation, or organized manufacturing industry or the responsible head or heads thereof, failing to comply with the provisions of this section shall be deemed guilty of a felony, and upon conviction shall be punished by imprisonment for not more than three years and a fine not exceeding $50,000." A000068.

12. Section 9 of the Selective Service Act further empowered the President to "place an order with any individual, firm, association, company, corporation, or organized manufacturing industry for such product or material as may be required, and which is of the nature and kind usually produced or capable of being produced by such individual, firm, company, association, corporation, or organized manufacturing industry. Compliance with all such orders for products or material shall be obligatory on any individual, firm, company, association, corporation, or organized manufacturing industry or the responsible head or heads thereof and shall take precedence over all other orders and contracts theretofore placed with such individual, firm, company, association, or organized manufacturing industry." A000068.

13. In 1940, Congress also established a number of war-related subsidiary corporations of the U.S. Reconstruction Finance Corporation ("RFC"), which Congress had created previously as a wholly-owned corporation of the United States and had authorized it to create subsidiary corporations "to aid the Government of the United States in its national-defense program." A000085.

14. One of the newly-created subsidiaries of RFC was the U.S. Defense Plant Corporation ("DPC"), which possessed the authority to acquire real property and to finance, own and oversee the design, construction, and operation of industrial facilities for the production of war products. A002979–A002982.

15. Another newly-created subsidiary of RFC was the U.S. Defense Supplies Corporation ("DSC"), which possessed the authority to purchase, stockpile and distribute war products for national defense purposes. A002983–A002984.

16. Another newly-created subsidiary of RFC was the U.S. Rubber Reserve Company ("RuR"), which possessed the authority to oversee the operation of synthetic rubber plants owned by the DPC for the production of synthetic rubber for national defense purposes. A002976–A002977.

17. On June 28, 1940, the President designated rubber as a strategic and critical material. A000092.

18. On May 27, 1941, President Roosevelt declared a State of unlimited national emergency. A000099.

19. On December 18, 1941—less than two weeks after Japan's attack on Pearl Harbor—Congress passed the First War Powers Act of 1941, Pub. L. No. 77-354, § 301, 55 Stat. 838 (1941) to "expedite the prosecution of the war effort" by granting the President broad powers to issue Executive Orders delegating the President's powers and authority to government agencies and corporations in order to facilitate the prosecution of the war. A000101.

20. In January 1942, by issuance of Executive Order 9024 President Roosevelt established the War Production Board ("WPB") in order to "assur[e] the most effective prosecution of war procurement and production" and delegated to it the power to impose mandatory policies and procedures for such production and procurement, including the power to issue mandatory directives concerning "contracting, specifications and construction." A000105–A000106. Executive Order 9024 further provided that the Chairman of the WPB was authorized to "exercise the powers, authority, and discretion conferred upon him by this Order through such officials or agencies and in such manner as he may determine; and his decisions shall be final." A000107.

21. A week later, by issuance of Executive Order 9040, President Roosevelt empowered the WPB with absolute authority over the prioritization and allocation of war products and further delegated to WPB the authority vested in the President by Section 120 of the National Defense Act of 1916, which therefore included the authority to seize privately-owned industrial plants. A000107.

22. In March 1942, Congress passed the Second War Powers Act, Pub. L. No. 77-507, 56 Stat. 176 (1942), and Section 301 of the Act granted the President priorities powers; specifically, all procurement orders placed by the U.S. Army or Navy had precedence over all deliveries for private account, or for export. Section 301 further provided that whenever the President determined that the fulfillment of requirements for the defense of the United States will result in a shortage in the supply of any material or of any facilities for defense or for-private account or for export, the President may allocate such material or facilities in such manner, upon such conditions and to such extent as he shall deem necessary or appropriate in the public interest and to promote the national defense. A000111.

23. In April 1942, by issuance of Executive Order 9125, President Roosevelt delegated to WPB the powers vested in the President by Title III of the Second War Powers Act of 1942, thereby empowering WPB with authority to require a company to produce a good needed for the war effort. A000121.

24. Executive orders are directives by the President of the United States, which may have the force of law when founded on Presidential authority derived from the Constitution or

statute. These directives generally govern the actions of officials and agencies of the Federal government. A000126.

25. The delegation of Presidential powers to various governmental agencies gave such agencies the authority to control industrial production during WWII. A000156.

B. Government Authorities/Controls Specifically Directed to the Petroleum Industry and Individual Oil Refineries

26. In 1946, a Government-prepared report titled *The History of the Petroleum Administration for War* stated the following regarding the vital importance of oil to winning WWII and the magnitude of oil production during the war:

> [f]or World War II, from beginning to end, was a war of oil. Almost seven billion barrels of it had to be brought from the ground between December 1941 and August 1945, to meet the requirements of the United States and its Allies, and nearly 6 billion of this enormous total came from the United States. That is *one-fifth of all the oil that had been produced in this country since the birth of the industry in 1855*. A000172.

27. While a number of petroleum products became vital war products during WWII, none was more critical to the Allied Forces' victory than avgas; in fact, the Government-prepared report titled *A History of the Petroleum Administration for War* stated the following regarding the importance of avgas during WWII:

> the superfuel that meant more speed, more power, quicker take-off, longer range, greater maneuverability -- all of the things that meant the victory margin in combat. This was the stuff that carried Doolittle over Tokyo, that winged our fighters over Africa and Europe, that powered our bombers from Midway to Hiroshima. A000180.

28. Ralph Davies—the Deputy Petroleum Administrator for the Petroleum Administration for War—stated the following in a hearing before a U.S. Senate Special Committee after WWII: "100-octane is to motor gasoline what the Lincoln is to the Ford. If birds ran on gasoline it would give a hawk the performance of an eagle…On all counts, 100-octane was the lifeblood of the United Nations in the air." A000234–A000235.

29. Geoffrey Lloyd—the British Minister of Fuel and Power—stated the following in regard to the importance of avgas, "I think that without 100-octane we should not have won the Battle of Britain. But we had 100-octane." A000253.

30. However, at the beginning of WWII, the Nation's refineries were collectively not equipped for the mass production of avgas required by the United States for use in WWII. A000181. In fact, just prior to WWII, it was estimated that the Nation's oil refineries could produce only 40,000 barrels per day ("B/D") of high-octane avgas, but at that time the U.S. military estimated that it "must have 150,000 barrels per day," and this was a fraction of the

636,000 B/D of high-octane avgas that the U.S. military estimated was needed at the height of WWII. A000181.

31. In a letter dated May 28, 1941, President Roosevelt stated to then Secretary of the Interior Harold L. Ickes, "[r]ecent significant developments indicate the need of coordinating existing Federal authority of oil and gas and insuring the supply of petroleum and its products will be accommodated to the needs of the Nation and the national defense program." A000214. In the letter President Roosevelt further stated that "[o]ne of the essential requirements of the national defense program . . . is the development and utilization with maximum efficiency of our petroleum resources and facilities, present and future, for making petroleum products available, adequately and continuously . . . ." A000214.

32. In May 1941, President Roosevelt established the Office of Petroleum Coordinator for National Defense ("OPC"), designated Harold L. Ickes as the Petroleum Coordinator for National Defense, and provided it with the authority to issue specific recommendations to the petroleum industry and individual oil refineries regarding necessary actions "to insure the maintenance of a ready and adequate supply of petroleum and petroleum products." A000214.

33. In February 1942, the Chairman of the WPB delegated to OPC the contracting authority for determining the price and technical details of avgas, and delegated to DSC all other contracting authority. A000216–A000218.

34. In December 1942, by issuance of Executive Order 9276, President Roosevelt established the Petroleum Administration for War as the successor agency to the OPC (hereinafter collectively with OPC, the "PAW") and a subordinate agency of the WPB. A000257. President Roosevelt authorized PAW "to coordinate and centralize the war policies and actions of the Government relating to petroleum with a view toward providing adequate supplies of petroleum for the successful prosecution of the war and for other essential purposes." A000257.

35. Among other things, Executive Order 9276 charged PAW with:

> a. establish[ing] basic policies and formulat[ing] plans and programs to assure for the prosecution of the war the conservation and most effective development and utilization of petroleum in the United States . . . [and] issu[ing] necessary policy and operating directives to parties engaged in the petroleum industry, and appoint[ing] such general, regional, local, or functional petroleum industry committees or councils as the Administrator finds necessary . . . .
>
> b. [s]erv[ing], as far as practicable, as the liaison and channel of communication between the units of the petroleum industry and the several departments and agencies of the Federal Government on matters directly involving the functions and duties of the [PAW] Administrator . . . [and]
>
> * * * * *

> d. [s]ubject to the direction of the [WPB], exercis[ing] the powers, authority, and the discretion conferred upon the [WPB Chairman] by issuing, and taking appropriate action to enforce, such orders or directives to the petroleum industry as the [PAW] Administrator may deem necessary, in order to [ ] provide adequate supplies of petroleum for military, or other essential uses, or [ ] effect the proper distribution of such amounts of materials as the Chairman of the [WPB] may allot for the use of the petroleum industry. A000257–A000258.

36. In regard to the specific types of petroleum products that were now under the authority of the PAW "for the successful prosecution of the war and for other essential purposes," i.e., in essence, war products, under Executive Order 9276, the Chairman of the WPB provided to the Petroleum Administrator of PAW the designated list of petroleum products which were considered such war products, and the listed petroleum products included all types of avgas, the various types of avgas components, such as alkylate and hydrocodimer, motor fuels, kerosene, residual fuel oil, toluene, lubricating oils, fuel oils, diesel oils, and asphalt, among others. A000257–A000259.

37. During WWII, PAW issued a series of over 80 directives that were published in the *Federal Register* and set forth requirements regarding the production of petroleum products that were to be complied with by specific petroleum refineries and/or the petroleum industry generally. A000219–A000226.

38. Initially, the PAW titled each directive "Recommendation," but in early 1942 began to title each directive "Directive" "as more consistent with their scope and purpose." A000175.

39. On October 2, 1941, PAW issued Recommendation 8 in the *Federal Register*. The purpose of Recommendation 8 was to increase avgas production by directing oil refineries to "cease to use" various blending components, except for the production of avgas. A000260–A000261.

40. On August 27, 1941, the Army and Navy Munitions Board declared avgas to be a critical war material. A000226.

41. Two days after Japan's attack on Pearl Harbor on December 9, 1941, PAW issued Recommendation 16 in the *Federal Register.* In Recommendation 16 PAW set forth its mandate to the petroleum industry and oil refineries to immediately maximize the production of avgas, stating "[i]t is essential, in the national interest, that the supplies of all grades of aviation gasoline for military, defense and essential civilian uses be increased immediately to the maximum." A000271.

42. Recommendation 16 also set forth that "[i]n order to increase to a maximum the production of all grades of aviation gasoline, the Committees or Subcommittees shall prepare plans for the use of all sources of the components or such gasoline and of all components of and facilities for production or capable of producing any grade of aviation gasoline in such manner

as will result in the maximum production of all grades of aviation gasoline in the shortest possible time." A000271–A000272.

43. In addition, Recommendation 16 also authorized PAW to control the following:

> ...allocation, exchange, license, pooling, loan, sale, or lease of crude oil, base stocks, blending agents, processes and patents, and production, transportation and refining facilities … whenever and to whatever extent may be necessary to facilitate the maximum production of all grades of aviation gasoline or to reduce the time required to produce such gasoline. A000272.

44. On July 21, 1944, PAW issued Directive 77 which set forth that PAW controlled all transfers of avgas, avgas base stocks and avgas components between refineries, and a refinery had to obtain specific authorization from PAW to manufacture or blend any other grade or type of fuel. A010314–A010315.

45. According to the Government report titled *The History of the Petroleum Administration for War*, Recommendation 16 prevented oil refineries from taking action independent of PAW approval:

> Except where in accordance with the provisions of an approved plan . . . no action shall be taken by any producer or refiner of any grade of aviation gasoline, aviation gasoline base stocks or aviation gasoline blending agents with respect to the production, storage, use, sale, or other disposition[.] A000272.

46. According to the 1946 Government-prepared report titled *The History of the Petroleum Administration for War*, PAW recognized that the production of avgas was a very complicated technological process that required the systematic coordination and use of various processing units. A000178–A000206.

47. According to the Government-prepared report titled *The History of the Petroleum Administration for War*, "[b]ridging that vast gap" between the limited pre-war avgas production capacity of the nation's refineries and military requirements entailed overcoming significant challenges:

> [It] constituted a feat which upon more than one occasion seemed impossible of achievement. It required the surmounting of obstacle after obstacle: in the beginning, lack of realization by the services of the great quantities they would need; and, growing out of this, heartbreaking difficulties in getting authorizations for increased plant capacities, in obtaining workable priorities, in getting delivery of materials even after priorities were granted, in maintaining sufficient trained manpower and common labor, in solving all-but-insuperable technical problems, and, above all, in doing all of these things in time. . . . [I]t produced a record that will forever stand to the credit of the industry that achieved it, and to the Government agency that supplied the direction, the coordination, the

> red-tape slashing, and the encouragement to accomplish the impossible. A000180.

48. According to the 1946 Government-prepared report titled *The History of the Petroleum Administration for War*, in the early 1940s the Government sought for various oil companies to drastically increase and maximize their production of avgas and other war products, but in order to do so, it would be necessary for such oil companies to make substantial financial investments in the construction of additional processing facilities for making avgas, avgas components and other petroleum products, such as additional alkylation units, which were necessary for making blending agents for avgas, and catalytic cracking units (known as "cat crackers") which were necessary for producing avgas base stock. A000181–A000189.

49. According to the 1946 Government-prepared report titled *The History of the Petroleum Administration for War*, in the early 1940s oil companies were reluctant to make substantial financial investments in new production facilities unless the Government was willing to enter into long-term avgas procurement contracts. A000182.

50. According to the 1946 Government-prepared report titled *The History of the Petroleum Administration for War*, the Government recognized that "if a company were to build a plant, it faced the possibility, especially if there were a short war, or no war at all, of finding itself with a multi-million-dollar installation, and nobody to buy the product." A000182.

51. According to the 1946 Government-prepared report titled *The History of the Petroleum Administration for War*, in November 1941, RFC provided DSC with the authority to enter into long-term avgas supply contracts with private oil companies. A000184.

52. In the 1942 "Four Party Purchase Agreement," DSC, U.S. Army, U.S. Navy and PAW agreed that DSC would act as the sole purchaser of avgas from the Nation's petroleum industry and would resell it to the U.S. Armed Forces as needed. A000121–A000215.

53. DSC was the federal agency that contracted for the purchase of all of the avgas produced during WWII. DSC entered into avgas supply contracts with various oil companies and under the contract DSC would purchase the refinery's entire production of avgas for a number of years. A000269

54. PAW and the DSC compelled oil companies, such as Humble and Standard Oil, to enter into the DSC avgas supply contracts and participate fully in the Government's avgas program; in fact, oil companies were not given a choice as to whether or not to contract with the DSC, as the following statement by George Parkhurst, PAW Director of Refining to George Hill, DSC Executive Vice President and General Counsel in a letter attests:

> P.A.W. insists that each company utilizes all of its facilities to make 100 octane aviation gasoline to the extent of its ability to do so, and <u>there is not in fact any freedom to make a choice between contracting and not contracting</u>. (underline added). A003238–A003239.

55. However, according to the 1946 Government-prepared report titled *The History of the Petroleum Administration for War*, PAW knew that the production of avgas and the

production of other petroleum products, such as motor gasoline, were not mutually exclusive but inextricably intertwined and therefore it was not possible to increase avgas production by decreasing motor gasoline production, stating that "there were many in authority who failed to understand the nature of the production problem involved and who clung to the view that 'gasoline is gasoline,' apparently believing that the refineries had only to cease shipments to civilians in order to turn out an ocean of 100-octane." A000182.

56. The 1946 Government-prepared report titled *The History of the Petroleum Administration for War* stated as follows:

> A fifth difference in the 100-octane program, as compared with others, is the fact that 100-octane cannot be produced alone. Its production is essentially a procedure for extracting by-products of petroleum refining operations. The by-products are of great value, but they are still by-products of petroleum in various forms, caught as the crude oil goes through the refinery in process of being broken down into its parts, purified and concentrated. A000195.

57. The 1946 Government-prepared report titled *The History of the Petroleum Administration for War* stated that if, for example, PAW ordered a particular refinery to modify the crude oil yield to make an additional 513 B/D of an avgas component that was desperately needed, the modification would also result in "1,500 barrels more of residual fuel oil, which was in surplus supply at the time, and 12,000 barrels less of home heating oil and 5,700 barrels less of gasoline, both of which were seriously scarce." A000206.

58. According to a Government reported titled *The History of the Petroleum Administration for War*, for administrative purposes PAW divided the United States into five districts and both the Baytown and Baton Rouge refineries were in District 3 (sometimes referred to by PAW as "District III"). A000173.

59. Pursuant primarily to Recommendations 16 and 33 and OPC Plan 15 (i.e., "Basis for the Formulation of a Refinery Operating Program"), PAW established the "Planned Blending Program." One of the key components of this program was that the PAW on a monthly basis determined how much crude oil and other raw materials each refinery would be allocated, and also dictated the amount of avgas and other war products that the refinery was to produce from this allotment of crude oil and other raw materials. A000271–A000272; A000273–A000274; A000276–A000282.

60. According to a Government reported titled *The History of the Petroleum Administration for War*, throughout WWII there was limited crude supplies available to supply refineries, and stated the following regarding the scarcity of crude oil required during the wartime period:

> From the very beginning until the last gun was fired in the Pacific, there was never a time when crude supply was not a problem somewhere in the country, with the exception of the Rocky Mountain region, which was always in balance. A000201.

61. Therefore, according to the same Government report, "[t]his system of allocations proved to be the most effective way that was found during the war for utilizing the continually-limited crude supply to best advantage. It was continued in force through August 1945, when the end of the European war made its continuance unnecessary." A000202. This Government report further noted that "there is no doubt that a large factor in meeting requirements was the system of monthly allocations of *specific* volumes of crude to *specific* refiners on the basis, always, of providing first for the minimum quantities estimated to be necessary to assure maximum output of war products." A000202.

62. In fact, each month PAW would issue a planned blending schedule for the succeeding month that was formally titled (for District III refineries) "Report of the Operations Subcommittee of the Refining Committee, District III on Minimum Crude Runs for Maximum War Products for [specific month] of Gulf Coast War Plants," and in this report after summarizing any relevant new refinery operations information (i.e., PAW stated that "[t]he operation of each refinery was investigated carefully") and noting any requests made by specific refineries regarding some aspect of their monthly crude allotment and war products production requirements, PAW set forth in detail the allotment of crude oil and other raw materials, and the required production amount of avgas and other war products, for each refinery (including the Baytown and Baton Rouge refineries) for the upcoming month. A000283–A000293.

63. A Government report set forth the following regarding the nature of the PAW's activities during WWII:

> [i]n order to augment the national productivity for [avgas] this Office took over practical effective control of its manufacture, even prior to the war. Refiners were instructed to send and ship available components in such a manner as to squeeze out the last barrel of product, regardless of commercial and economic considerations. A000299.

64. The Government report titled *The Role of Defense Supplies Corporation in the Wartime Aviation Gasoline Program* set forth the following regarding the nature of the PAW's activities during WWII: "activities of private companies were coordinated and supervised by [PAW]" because "PAW viewed the various companies' refineries as units of one enterprise and directed their operations so as to produce the maximum quantities of aviation gasoline at the earliest possible time." A000305.

65. The Government report titled *A History of the Petroleum Administration for War* set forth the following:

> [o]ne of the wartime conditions which served to harass the refiners as much, perhaps, as anything else was the frequent need to change yields so as to produce, at all times, the maximum quantities of most-needed products. One day, refiners would have instructions from PAW to increase their yields of gasoline and cut down their yields of fuel oil. On another occasion, the ever-shifting requirements of war might call for exactly the opposite. And, adding to the difficulty, the orders often had

> to be dispatched in the form of telegrams, calling for the changes to be made virtually overnight. A000206.

66. The Government report titled *The History of the Petroleum Administration for War* set forth that PAW was "the virtual czar of 100-octane in the United States," further noting that PAW "called upon the industry to devise plans for using all facilities and raw materials as though they all belonged to one company . . . [i]n a word, 'forget economic considerations--forget everything except getting out more and more 100-octane as quickly as you can.'" A000186.

67. The Government report titled *The History of the Petroleum Administration for War* set forth the following: "[y]ields of products were frequently changed [by PAW] at the Nation's refineries, almost overnight, despite the effect upon earnings; the single test was, did the war program necessitate the change?" A000177.

68. The Government report titled *The History of the Petroleum Administration for War* set forth the following:

> [i]nsofar as products for war and for essential civil use were concerned, PAW told the refiners what to make, how much of it to make, and what quality. Nobody wanted it to be that way – neither PAW nor the refiners. It just happened to be the only way to do it in wartime. A000206.

69. In December 1941, the petroleum industry's trade journal—the *Oil & Gas Journal*—reported that through Recommendation 16 "[t]he Government took complete control of the aviation gasoline industry through a formal 'recommendation' from Petroleum Coordinator Harold L. Ickes which is tantamount to a mandatory order and was so described in the official release of the Office of Petroleum Coordinator." A003240–A003243.

70. Also in December 1941, the *Oil & Gas Journal* further reported the following regarding the significance of Recommendation 16 issued by the Office of Petroleum Coordinator:

> [f]ederal direction of the aviation-gasoline industry, instituted this week by the Office of Petroleum Coordinator, is probably the most significant order issued by the oil agency … Promulgation of the aviation-gasoline recommendation, which has the full force of an order, came after chairmen of the district refining functional committees and representatives of refiners spent several days in Washington, D.C., discussing the most feasible methods of accomplishing the objective of greater production. A003245.

71. In July 1942, the *Oil & Gas Journal* reported how the Government exercised "strict control of every phase of the industry" and required the industry to "virtually turn[] over its facilities to the command of the Government," stating in full as follows:

> [r]evolutionary changes in the relationship between the oil industry and the federal government developed during the first half of 1942. Wartime

> exigencies forced strict control of every phase of the industry, and, like others the petroleum industry virtually turned over its facilities to the command of the Government. Most of this control was exercised by new regulatory agencies set up for the duration under executive powers of the president. . . . Chief regulatory agency affecting the oil industry is the Office of the Petroleum Coordinator. A003246–A003249.

72. In September 1942, the *Oil & Gas Journal* reported that the petroleum industry's operations "are controlled fairly rigidly by fiat" by the Government, stating in full as follows:

> [p]erhaps the most notable of all wartime changes in the petroleum economy are those collectively arising from the imposition of control over the operation of the industry by governmental agencies. It is remarkable what can be done to an industry when some important element of its affairs are controlled fairly rigidly by fiat. A003250–A003252.

73. In a 1943 PAW "Handbook" for the avgas program, PAW itself acknowledged that as part of PAW's mission it took control of the Nation's refineries and treated them as "one vast national refinery," stating as follows:

> [e]very refining facility was closely examined to the end that 100 octane supply be supplemented . . . Inter-plant movement of component parts of 100 octane was effected by a "planned blending" schedule for refiners. Expert juggling of these components and elimination of bottlenecks in transportation insured maximum quality and quantity of the blended fuel. <u>Under this plan the nation's refineries were all treated as units in one vast national refinery</u>. A000325. (underline added)

74. PAW correspondence from 1945 reiterated how the agency had used its substantial control to treat the petroleum industry as integrated production units for maximum production of avgas, stating as follows:

> It should be pointed out here, for the benefit of background information in connection with your review of the aforementioned documents and by way of illustration in conveying a quick perspective of the principles and objectives of the Plan, that <u>during the emergency period the entire petroleum refining industry may be said to have been considered as integrated production units whose operations have been coordinated into a single, cooperative organization through recommendations and authorizations of the Petroleum Administration for War</u> in a manner designed to permit the maximum overall production and utilization by the industry of components suitable for inclusion in 100-octane aviation gasoline to the end of achieving a maximum overall production of such fuel of the quality required by the Armed Services. (underline added) A003253–A003259.

75. In a 1943 PAW report regarding the avgas program, PAW laid out its seven-step program for maximizing avgas production at individual oil refineries, stating as follows:

> [t]here are seven physical ways to expand production. These are:
> 1. Change the specifications for the product in such a way as to augment production;
> 2. Regulate the operation of refining units in such a way as to conserve all raw materials that may be used in the product, i.e., to prevent the diversion of valuable components to other uses;
> 3. Blend (mix) all of the components (ingredients) available in the United States in such a way as to assure maximum production;
> 4. Force each refining operating unit to its maximum output;
> 5. Remove "bottlenecks" in operating units by the judicious use of small amounts of construction materials . . . ;
> 6. Adapt existing refining facilities to 100 octane production . . .; and
> 7. Build new 100 octane units. A000332.

76. Ralph K. Davies, the Government's Deputy Petroleum Coordinator, ordered that "[w]hatever is necessary to keep the production of these critical products [(avgas and toluene)] at a maximum will be done, even though this means at an extremity that products normally marketed be considered as waste if there is no possible way of storing them." A003260.

77. J. Howard Marshall, Chief Legal Counsel for the PAW during much of WWII, testified in deposition on August 8, 1991 in the case of *United States v. Shell Oil Co.*, Civ. A. No. CV 91-0589-RJK (C.D. Cal.) ("*U.S./Shell Litigation*"). Marshall testified regarding how the PAW controlled the operations of refineries, allocating the crude oil and raw materials and compelling the refineries to produce the war products that the Government wanted the refineries to produce, stating as follows:

> Q. . . . As I understand your - - your testimony, the refiners could not use their own facilities in the way they wanted during the - - World War II?
> A. That's right.
> Q. They had to be used for the products that the government said - -
> A. We told them what they had to make.
> Q. Okay. And they couldn't even use their crude oil the way they wanted, that was allocated?
> A. Crude oil was all subject to allocation of one kind or another.
> Q. What about the source of their supplies, could they control that? If they needed components, could they just go out on the market and buy the components?
> A. No. There wasn't any market. A003268–A003269.

78. According to J. Howard Marshall at this deposition, PAW would shut down a refinery that attempted "to opt out of this 100 octane program," testifying as follows:

Q. So if - - if a refinery said, "We want to opt out of this 100 octane program. We want to go ahead and make regular gasoline," was that an option?
A. No.
Q. What - - what would PAW have done?
A. We would have shut him down; take away his materials and supplies. You didn't have to take him to court, for which I was fortunate. I just took away his materials and priorities. Usually you couldn't operate a week without it. A000352.

79. In the same deposition, J. Howard Marshall testified about PAW's use of the threat of coercive measures to compel an oil company's compliance and cooperation, and provided refinery-specific examples of PAW's coercive measures, stating as follows:

Q. . . . [B]ut you said that PAW didn't use a club, but it had a big club, didn't it?
A. It had a big one. It had all the powers of the President of the United States under the Second War Powers Act. And they are about as broad and comprehensive of any statute that was ever written, that I know about.
Q. You said before, "and they knew it." What did you mean by that? Who was the "they"?
A. Whoever wasn't going to do what we wanted them to do.
Q. Was that something that was spoken of from time to time in your dealings?
A. Oh, of course it was. I spoke of it. If I ran into a recalcitrant member of the business. I remember once I said to Colonel Drake, of the Gulf Oil Company, "Colonel, have you figured out how long your refiners can operate without priority on critical supplies?"
Q. What did he say?
A. He mumbled, but then he did what I wanted him to do. A000344–A000346.

80. At the same deposition J. Howard Marshall testified further as follows:

Q. Okay. You once mentioned a company up in Ventura, California that showed some reluctance to go along with the program.
A. Not some, everything he could muster.
Q. What . . . was the problem there?
A. Well, we had a series of quotas for each company in the field. And all of them, with this one exception, obeyed the quotas and lived by them. And they said, "To heck with you. We're going to run our business and you keep your hands off of it. It took me a day to take his material priorities away from him. He came, with his tail between his legs about a week later, said "All right. I want to make peace."
I said, "You better."
Q. Explain what you mean by materials priority.

A. To run a refinery, or an oil well, you have to have a constant supply of materials and maintenance. Just run-of-the-mill stuff to keep the thing on - in operation. And you take those essential parts away and the fellow goes down. He can't operate without it. Now, only one part will stop him. He might have enough of five but lack the sixth. Down he goes. A000350–A000352.

81. Louis R. Goldsmith— a PAW Refinery Division official from 1942 to 1944—testified in deposition as follows in the *U.S./Shell Litigation* regarding PAW's ability to cut off crude oil supplies to refiners:

> The industry really had no - - no choice in the matter. They either produced - - - the products in accordance with the instructions and directives of PAW or they would probably be denied an allocation of crude oil. And they'd pretty much cut [the oil company] off at the pockets, they wouldn't have any business to operate, so the industry was not only willing but anxious to comply with government directives[.] A009619.

82. Lincoln Gordon—a Director at the War Production Board—testified similarly as follows:

Q. If a refinery said we don't want to convert our facilities to produce 100 octane because we don't make as much money on 100 octane as we do on other projects, what was the power of the Government? What could they do?

A. I said that in that hypothesis, which I don't think ever occurred, that the Government did have the power to allocate the facilities, which meant to order the refinery to make the changes necessary to produce the high octane gasoline at the sacrifice of motor gasoline or whatever this other product was.

Q. If the refinery still didn't comply with such an order, what was the power of the Government?

A. Oh, the sanctions that could be applied. The Second War Powers Act in the extreme contained criminal sanctions, fines and imprisonment. Short of that, there were other available sanctions. This is, as I pointed out, an unreal hypothesis. But there were at least two other kinds of powers that could be applied.
<u>One would be the seizure power under Section 9 of the Selective Service Act of 1940. That is, that Government could actually take over the plant and then make the conversion. The other would be the denial of priorities for these other purposes that the refinery was engaged in.</u> (underline added) A003275–A003276.

83. Louis R. Goldsmith testified about PAW's relationship with the petroleum industry:

> So PAW's objective was to make sure that the whole petroleum industry was operated just as if it were one company which, of course, meant that the antitrust restrictions that had always governed the industry had to be set aside so that there could be total cooperation. And I can assure you that the government was the controlling force in all of this because the government's objectives were laid out very clearly to optimize what the industry can do and to monitor and control it in whatever way was possible to maximize the production of critical components. A009608–A009609.

84. Louis R. Goldsmith also testified that PAW directed the refiners regarding the products, principally avgas, that they would produce:

> If you're going to produce at all, you've got to produce these kinds of products. And -- and if you're going to invest money, and most particularly going to use up strategic materials in the construction of facilities, thou shalt have them designed to make the optimum quantities of 100 octane aviation gasoline, butadiene feed stocks and such other materials as the government may require. A009624.

85. At deposition, J. Howard Marshall further testified that avgas was the most critical component to winning the war, stating as follows:

> Q. Is it too far to analogize the government program for 100 octane as similar to the Manhattan Project, in terms of a critical component to - - win the war?
>
> A. Of course, it was. On a different scale. Maybe a bigger one. By a large - - a bigger one. A003268.

86. According to historian John H. Ohly in his treatise titled *Industrialists in Olive Drab* - *The Emergency Operation of Private Industries During World War II*, the Government seized at least 938 private industrial facilities during WWII and these seizures affected over 1.8 million private sector employees at these facilities. These facilities were seized by the Government in furtherance of the war effort and for reasons as specious as "labor-management issues" and "dissatisfaction with the management." A000356; A000359; A000362.

87. PAW seized a number of oil refineries, including Humble's oil refinery in Ingleside, Texas, during WWII. A000365; A000367–A000368.

88. The Government's plant seizures during WWII were well publicized in widely available national publications; for example, in December 1943, *Business Week* listed the plants seized to that date and described the Presidential seizure power as "the big stick," stating that "[e]xistence of the club has made it comparatively easy to assure compliance in other cases without resorting to seizure." A000370.

89. Aside from the significant contribution of avgas and other war products production to winning the war, the Government benefitted greatly from being able to convert

and direct the refineries' operations into war-related production in many respects; in fact, refinery operations and forensic waste issues expert Gregory Kipp identified some examples of the wartime benefits to the Government, including the following: "1) The Government was able to ramp up production of 100 octane avgas quickly. . . . 2) the Government benefitted from existing production infrastructure, ports, pipelines, and rail networks feeding these major refineries to rapidly maximize production of wartime products. . . . 3) The Government benefitted from pre-existing know-how by the refiners in processing petroleum and constructing petroleum units quickly. . . . 4) The Government knew that avgas production would necessarily result in byproducts such as motor gasoline, kerosene, fuel oil, and lubricants which the Government needed for the war effort. . . ." Ex. 2, Att. B, Kipp 2016 Rpt. at 30.

90. At the conclusion of WWII, key U.S. military leaders released a joint statement acknowledging the benefits to the war effort by the petroleum industry and the refineries, stating in part:

> . . . at no time did the Services lack for oil in the proper quantities, in the proper kinds and at the proper places. Because of the resourcefulness, untiring and unceasing efforts, and outstanding accomplishments of the Petroleum Administration for War and the petroleum industry, not a single operation was delayed or impeded because of a lack of petroleum products. No Government agency and no branch of American industry achieved a prouder war record. A003278.

III. <u>Baytown and Baton Rouge Facilities</u>

A. The Government's Operational Control of the Baytown and Baton Rouge Facilities During WWII

1. Products, Production Levels, Production Operations and Resulting Waste Generation

91. During WWII, the crude oil throughput capacity increased by approximately 36% at the Baytown Facility and by approximately 30% at the Baton Rouge Facility. Ex. 8, Att. B, J. Johnson 2012 Rpt. at 38–39.

92. The production of 100-octane avgas increased by 3500% at the Baytown Facility during WWII as compared to pre-war production levels. Specifically, at Baytown 100-octane avgas production increased from 777 B/D in 1940 to 27,900 B/D in 1944—more than a 3500% increase in production. A000406; A003280. (The annual production level of 100-octane avgas at the Baton Rouge Facility in 1940 is not available to make a similar comparison to wartime production levels.)

93. The Baytown and Baton Rouge Facilities were two of only three refineries to manufacture over one billion gallons of 100-octane avgas during WWII on behalf of the Government; in fact, the Standard-affiliated companies produced approximately 20 percent of the avgas consumed by the Allied Forces during WWII. A000004; A000381; A000393.

94. According to a report submitted by Humble to the Government in June 1943 in conjunction with an on-site inspection of the Baytown Facility by various Government "war agencies," in June 1943 Humble estimated that in that month its production levels of avgas and other byproducts as a percentage of total refinery output by volume would be the following: (a) 100-octane – 12.7%; (b) gas as refinery fuel – 12.9%; (c) residual fuel oil – 10.6%; (d) lube distillates – 2.1%; (e) lube oils – 1.0%; (f) gas oils – 10.7%; (g) heating oils – 5.4%; (h) kerosenes – 9.7%; (i) Navy fuel oil – 8.2%; (j) Navy diesel fuel – 1.9%; (k) military lubes – 2.5%; (l) avgas components – 1.1%; (m) xylene – 0.5%; (n) toluene – 2.8%; and (o) gasoline – 17.9%. A000890.

95. According to a report submitted by Standard Oil to the Government in May 1943 in conjunction with an on-site inspection of the Baton Rouge Facility by various Government "war agencies," Standard Oil stated that at that time in 1943 its production levels of avgas, other byproducts, and synthetic rubber as a percentage of total facility output by volume were the following: (a) 26.2%; (b) butadiene – 0.6%; (c) butyl rubber – 0.8%; (d) perbunum rubber – 0.1%; (e) toluene – 0.3%; (f) military lubes – 1.4%; (g) asphalts – 3.8%; (h) alcohols and ethylene – 1.4%; (i) low octane avgas – 1.8%; (j) motor gasoline – 21.3%; (k) kerosene and trade gas oils – 11.4%; (l) motor and industrial lubes – 2.6%; and (m) fuel oil and residue gas – 28.3%. A000907.

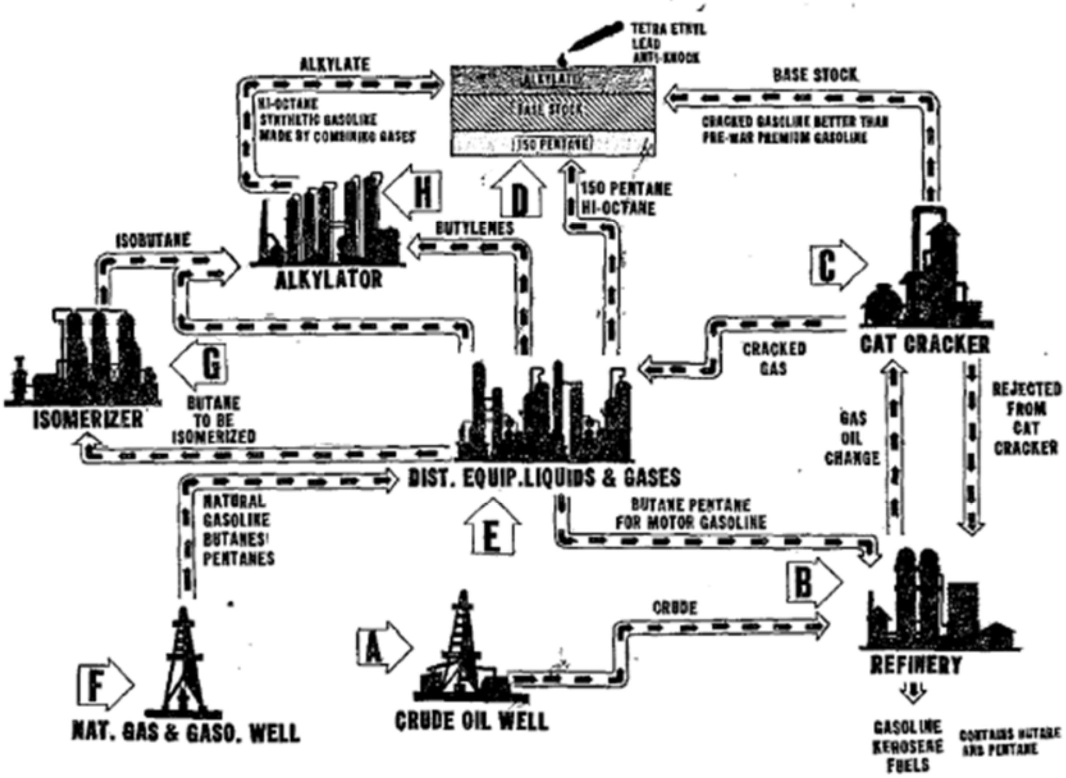
96. PAW directed Humble and Standard Oil to maximize the production of avgas for the Government at the Baytown and Baton Rouge Facilities during WWII. PF ¶¶ 41, 48, 74, 130.

97. The Government acknowledged that the Baytown refinery was operated "in exact accordance with P.A.W. instructions" during WWII to maximize avgas production, stating in a 1944 Government report the following:

> [i]n a survey which specifically refrains from rating individual companies, P.A.W. confirms Humble's statements regarding the pre-war production of 100 octane gasoline, the expansion of facilities to increase output, the conduct of operations in exact accordance with P.A.W. instructions, the participation in the synthetic rubber program and the production of toluene. A003281–A003297.

98. The 1946 Government-prepared report titled *The History of the Petroleum Administration for War* provided a simple schematic of how 100-octane avgas was produced at refineries during WWII, and the report titled the schematic "How 100 Octane Gasoline Is Made," which is reprinted below. A000181.

HOW 100 OCTANE GASOLINE IS MADE



99. Two refinery operations experts—David B. Lerman and John M. Beath—opined that all of the crude oil had to be processed in order to maximize avgas production at the Baytown and Baton Rouge Facilities as required by the Government during WWII. Both experts concurred that when the crude oil is processed in the distillation units, some, but not all, of the resulting crude fractions can be converted into avgas base stock or other avgas-related intermediate or component; for example, expert Lerman stated that "[r]efiners cannot convert a barrel of crude oil solely into a barrel of a single product such as avgas." Expert Lerman further opined that "all of the crude had to be processed to produce the avgas. . . . Therefore, all of the crude oil charged at Baytown and Baton Rouge contributed to the production of avgas during the WWII war effort," Ex. 9, Att. B, Lerman 2015 Rpt. at 8 and 32, and "a reduction in crude distillation rate would have reduced avgas production." Ex. 9, Att. B, Lerman 2015 Rpt. at 6–7. Similarly, expert Beath stated that "it is my further opinion that all of the crude oil processed at these refineries was necessary to meet these avgas production goals. The first step in the production of avgas was the processing of crude oil in the distillation units because such crude oil processing was necessary to produce the avgas base stock and the avgas components; in fact, the initial production step for both the avgas base stock and the avgas components required the processing of the same crude oil in the distillation units." Ex. 5, Att. B, Beath 2012 Rebuttal Rpt. at 6–7.

100. Government expert witness Dr. James Kittrell concurred with experts Lerman and Beath that all of the crude oil had to be processed to produce the necessary avgas base stock for avgas production. In deposition, Dr. Kittrell testified as follows:

Q. And how would you make the most Avgas you could given those situations?
A. Well, again, the way--the way that--the way it worked out was PAW looks at my refinery, looks at the Baton Rouge Refinery and Baytown Refinery and 398 other refineries--looks at those refineries and tries to look for bottlenecks and find out who needs what to make more Avgas; and they bring stocks in and they send stocks out. And I will--as a refiner, involved with the plan, I will try to take all those stocks and run all the crude allocated to me, and I'm going to try to maximize the Avgas from that pile of information that I have.
Q. Would you--would you have been required to run all the crude that you had in order to assist in meeting the Government's goal of maximizing Avgas?
A. Well, you run all the crude you had, but all the crude is not used to make Avgas. I mean, part of the crude is used to make marine diesel, for example. You know, and that's--that's--that's life. I mean you're making--you're making other products from--from this same cut or variations of that cut. You know, it doesn't have to be exactly the same cut. So--so, yeah, you'd run all the crude you had available to you, and you'd make all the Avgas you can have available to you, but that doesn't mean that every barrel of that crude was needed to make that barrel of Avgas.
Q. But in order to make the barrels of Avgas that you needed, is it fair to say you need all the crude to be--that was devoted to the plant to be used to be distilled?
A. . . . Given the constraints, yeah. And the constraints are that it's also making marine diesel; it's also making heating oil; it's also doing a bunch of other things that are part of the equation. And they maximize--and they used every barrel of crude oil for this entire slate of products, that's for sure, but it wasn't all used to make Avgas. A003315–A003320.

In his deposition, Dr. Kittrell also testified as follows:

Q. So what is the reason why the general proposition of Exhibit 2 that we just discussed in those two sentences would not apply in this particular case?
A. But—the—what I've said in Exhibit 2 is that crude processing rate is sometimes used as a surrogate for waste production.
Q. In refineries?
A. In refineries, that's right
And you're asking me why does that not apply?
Q. In this case.
A. Well, there—the people put factors in for—for improvements in waste production. People look at complexity of refineries as being a significant concept, but there's—there's a number of other factors that—that are also significant, and—and as one tries to apply, in this case, crude oil

> processing as a surrogate, you know, it is useful as a surrogate for some applications.
>
> Just—just don't misapply it, because there are things like complexity, which is known to be a factor on waste; and refinery size, which is known to be a factor—a—a—a factor on waste, among a few, that are also important. And I think people are trying to adjust for those other factors. A010316–A010318.

101. According to refinery operations expert John M. Beath, PAW's mandate to maximize the production of avgas for the Government also required the operation of virtually all of the process units in very close coordination at the Baytown and Baton Rouge refineries during WWII. Ex. 5, Att. B, Beath 2012 Rebuttal Rpt. at 6.

102. Expert Beath graphically depicted how virtually all of the process units, including, for example, the crude distillation units, thermal crackers, fluid catalytic crackers, alkylation units and hydrogenation plants, were involved in avgas production; by using a 1943 Baton Rouge production flow diagram, Beath showed all of the process units involved in the production of avgas during WWII (i.e., the process units colored in blue):

Figure 1 – Major War Products Process Unit Block Flow Diagram for Baton Rouge Refinery

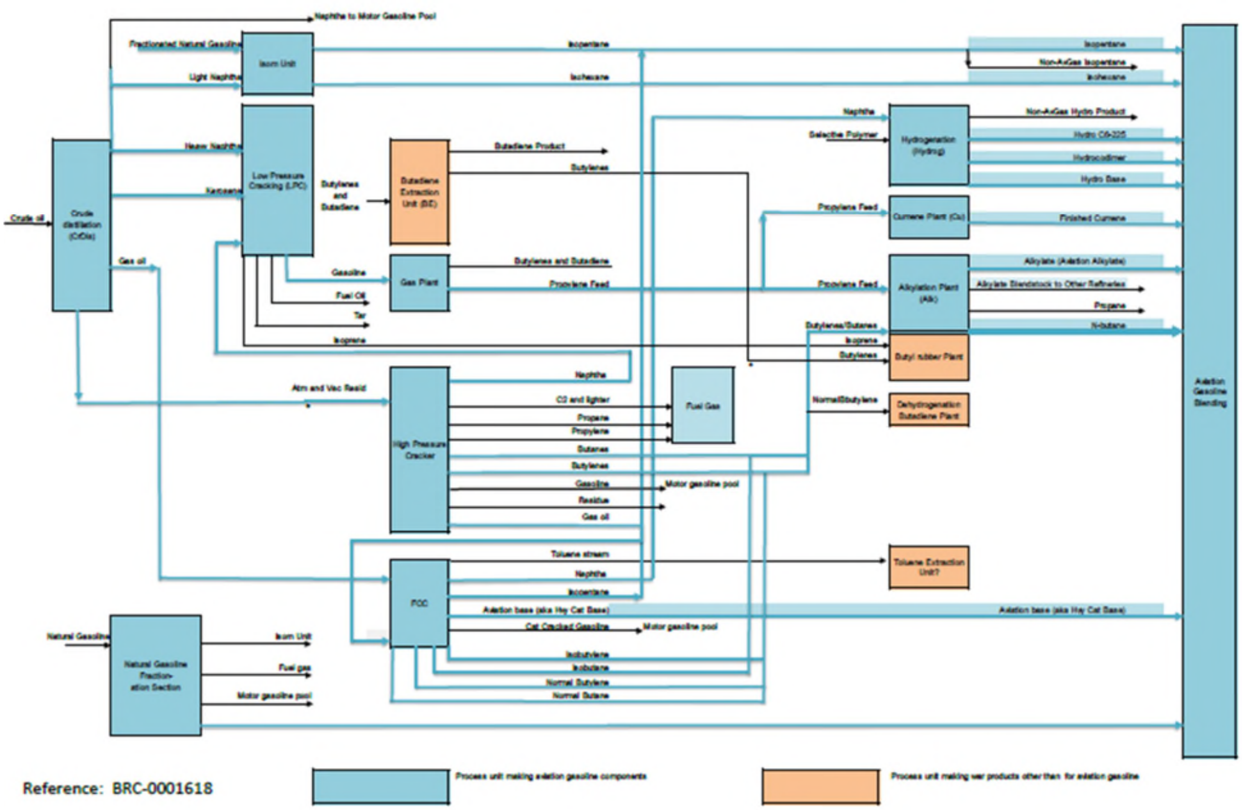


Figure 4, Baton Rouge War Products Flow Diagram (cited in Ex. 5, Att. B, Beath 2012 Rebuttal Rpt. at Figure 1).

103. Maximizing avgas production as mandated by the Government also required the operation of the other Government-owned Plancors at both the Baytown and Baton Rouge Facilities and the Baytown Ordnance Works (at the Baytown Facility) because these other plants manufactured raw materials used for the production of avgas and other war products at the respective refineries. PF ¶¶ 153–55.

104. Both the Baytown Facility and the Baton Rouge Facility, including both the refinery process units and the Government-owned plants at both Facilities, had to be fully converted and integrated to comply with the Government's directives regarding the maximum production of avgas and other war products during WWII. According to refinery operations expert Jere M. Johnson, "from an engineering and technical standpoint, during the wartime period the Federal government required that both [the Baytown and Baton Rouge] Complexes be operated in an integrated manner in order to maximize their crude processing capabilities and war products output, resulting in a 100% conversion of all facilities to the maximum production of 100-octane avgas and other war-related materials for the Federal government." Ex. 8, Att. B, J. Johnson 2012 Rpt. at 11.

105. Refinery operations expert David B. Lerman described in detail how the refinery operations had to be operated in an integrated and closely coordinated manner in order to maximize avgas production. Expert Lerman stated that "refiners organize their refineries into a set of coordinated, interrelated process units that have to operate in concert with each other to produce a slate of refined petroleum products. Therefore, to maximize the avgas production, the refineries have to process all of the crude oil to squeeze out every drop of high-octane material as possible from a barrel of crude oil. To minimize waste and address associated issues, the refineries would maximize the amount of saleable products they could produce from the by-products." Ex. 9, Att. B, Lerman 2015 Rpt. at 5. Expert Lerman further stated that "[i]n reality, a refinery is an 'organized and coordinated arrangement' of crude distillation and downstream process units with interdependencies in order to produce a slate of refined petroleum products. Just as in an orchestra, all of the refinery process units have to work in concert in order to produce refined petroleum products." Ex. 9, Att. B, Lerman 2015 Rpt. at 29.

106. Expert Lerman further opined that the planning and scheduling function was a key to operating the refinery in a manner that would maximize the desired products, stating "[i]f a refinery is an orchestra, the individual process units are the instruments, and then the planning and scheduling function is the conductor. There are several basic functions in planning and scheduling. The first function is crude oil selection and charge rates. . . . The second basic function of the planning and scheduling is to identify the slate and quantities of the refined petroleum products. . . . The third basic function of the planning and scheduling is the timing of when to produce certain quantities of refined petroleum products for shipment to customers. . . . The fourth basic function of planning and scheduling is optimization either to maximize profits, or to minimize costs to meet a fixed demand." Ex. 9, Att. B, Lerman 2015 Rpt. at 13–14.

107. Expert Lerman further opined that the Government took over the planning and scheduling function in order to maximize avgas production at the Baytown and Baton Rouge

refineries during WWII, stating "[t]o maximize avgas production for the WWII war effort, the government took over the planning and scheduling function and issued operational instructions to the Baytown and Baton Rouge refineries to maximize avgas. Therefore, both refineries had to process all of its alloted crude oil each month. The management at the Baytown and Baton Rouge refineries received the government's operating orders; they did not choose to make their own operating instructions." Ex. 9, Att. B, Lerman 2015 Rpt. at 7.

108. Refinery operations and forensic waste issues expert Gregory Kipp opined that the "Government directed fundamental aspects of refinery construction and operation by dictating such factors as: (1) the types and quality of materials used for construction and repair of refinery equipment, (2) the types of petroleum fractions that would be produced, (3) the manner in which those fractions would be blended and utilized, (4) the quality of products delivered to civilians to secure premium products for the Government, (5) the intensity (aka severity) with which the equipment would be run, (6) the frequency and priority of repairs, and (7) whether materials would be authorized to abate the extensive pollution that necessarily resulted from wartime production." Ex. 2, Att. B, Kipp 2016 Rpt. at Executive Summary.

109. Humble acknowledged that the entire Baytown refinery was converted to war products production during WWII, stating in a 1943 internal memorandum the following:

> [c]urrent production of war products represents essentially 100% conversion" of the Baytown refinery's operations even though the "output of war products is 31.1%" because "it is unavoidable that other products, such as motor gasoline, kerosene, heating oil, and residual fuel oil, be made as byproducts." A000395.

110. Similarly, Standard Oil acknowledged that the entire Baton Rouge Facility was converted to war products production during WWII, stating in a 1943 report that critical and non-critical war products for the Government accounted for 100% of the Facility's production. A000907.

111. The production of avgas at the Baytown and Baton Rouge Facilities necessarily resulted in the production of a number of byproducts; in fact, in the avgas supply contracts, the Government acknowledged that the production of avgas necessarily resulted in the production of byproducts; for example, Section XII of the Master "Suppliers" Contract between the DSC and Standard Oil Company of New Jersey specifically set forth the following:

> [N]ormal operation of said refinery in which substantial quantities of motor fuel and other products must necessarily be produced and sold in connection with the production of 100 octane aviation gasoline.

112. Humble acknowledged that the production of avgas at the Baytown Facility resulted in the production of various other byproducts, such as motor gasoline, kerosene, diesel, bunker fuels, heating oil, lubricants, petroleum coke and petrochemical feedstocks. A000393.

113. Expert Lerman made a number of related technical findings that avgas production resulted in the production of various byproducts, stating that "[r]efiners cannot convert a barrel of crude oil solely into a barrel of a single product such as avgas. The other

refined petroleum products are necessary by-products in order to produce avgas." Ex. 9, Att. B, Lerman 2015 Rpt. at 8. Expert Lerman also stated that "the Baytown and Baton Rouge refineries had to produce a slate of by-products in order to produce the avgas mandated by the government contracts," Ex. 9, Att. B, Lerman 2015 Rpt. at 32, and that "[b]ecause the content of crude oil is a wide distribution of hydrocarbon molecules with varying number of carbon atoms and atomic structures, it is impossible to produce avgas without producing a number of other by-products such as motor gasoline, kerosene, diesel, bunker fuels, heating oil, lubricants, petroleum coke and petrochemical feedstocks." Ex. 9, Att. B, Lerman 2015 Rpt. at 5.

114. The Government knew that its directives and instructions regarding the production of avgas and various byproducts, i.e., other war products, essentially determined the amount of waste generated by the Baytown and Baton Rouge refineries. Refinery operations expert Lerman opined that "as a result of taking over the refineries' planning and scheduling functions to maximize production of avgas, the government made operational decisions specifically related to waste disposal," and further stated that "governmental directives were issued knowing that they had an effect on any refinery waste disposal operations." Ex. 9, Att. B, Lerman 2015 Rpt. at 23. Further, expert Lerman stated that "because the government issued operating instructions to the Baytown and Baton Rouge refineries on how much crude oil and other raw materials to refine each month to maximize avgas production, the government's operating instructions determined the amount of resultant waste generated at the refinery." Ex. 9, Att. B, Lerman 2015 Rpt. at 24. Expert Lerman concluded that "the government got sufficiently granular in its operating instructions as to specify the crude charge rates and the amount of other raw materials transferred between refineries to maximize avgas production. Because the government got so granular in its operating instructions, the government decisions on how to operate the refineries determined the amount of waste at the Baytown and Baton Rouge refineries during the World War II war effort. Thus, the government made operational decisions specifically related to waste disposal at Baytown and Baton Rouge during the wartime period." Ex. 9, Att. B, Lerman 2015 Rpt. at 45–46.

115. Similarly, refinery operations and forensic waste issues expert Gregory Kipp opined that "[t]he Government's direction over the construction of new, reconfigured or expanded process/production units and waste disposal facilities, and its direction over the production operations and ancillary operations was <u>tantamount to control over waste generation and disposal</u>," and further stated that "the Government's direction over refinery operations was tantamount to mandating the amount and toxicity of waste generated at these two refineries and the manner in which it was processed and disposed. Consequently, the Government was intimately aware of and involved in decisions related to waste generation and disposal. Moreover, the production of wartime products entailed the creation and treatment of non-avgas petroleum byproducts. Crude oil is comprised of many substances, maximizing avgas production necessarily generated 'by-products,' which the Government recognized. Those byproducts, in turn generally had to be treated, which produced wastes. Thus, because the non-avgas products existed by virtue of the avgas program, the wastes that resulted from their treatment was generated as a result of the production of avgas." Ex. 2, Att. B, Kipp 2016 Rpt. at Executive Summary (underline added).

116. Expert Kipp further opined that the Government knew that the production and other operations that it was directing generated substantial waste that the existing waste

processing equipment was inadequate to manage, stating "the Government recognized the consequences its directives had on waste generation and disposal. Indeed, the PAW recruited 'its executive and technical personnel . . . mainly from oil companies,' and so staffed the agency with personnel well-qualified to understand the current disposal capacity of the industry--and who also knew that increased production would necessarily create increased waste, and that new wartime production demands would create new and increasingly toxic forms of waste." Ex. 2, Att. B, Kipp 2016 Rpt. at 3.

117. Expert Kipp opined that "the Government requirements for specific types and amounts of hydrocarbons necessitated that the refiners press their equipment into higher than normal pressures and temperatures that prompted further compromises to equipment integrity, while the Government simultaneously directed the refiners to avoid maintenance shutdowns to the maximum extent possible. In essence, the Government wartime requirements created ideal conditions that would not only create leaks during wartime itself, but leave a legacy of leaky, fouled, corroded, abraded and otherwise compromised equipment that produced leaks after the war." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 37.

118. In order to comply with the Government's war-related production mandate and requirements, it was also necessary for the Baytown and Baton Rouge refineries to operate at full capacity. Expert Lerman found that "[t]o meet the government's mandate to maximize avgas, it would be most likely that both Baytown and Baton Rouge ran their alkylation units at their maximum capacity, ran their FCC [fluid catalytic cracking units] at maximum capacity to produce light olefins for the alkylation units and ran their crude distillation units at capacity to provide the gas oil necessary for the FCCs." Ex. 9, Att. B, Lerman 2015 Rpt. at 22.

119. Throughout the war, PAW issued directives to all refineries to run their production operations on a continuous basis and minimize downtime for routine maintenance and repair. For instance, Bruce Brown, Assistant Deputy Petroleum Administrator, issued the following order on June 21, 1944:

> (1) Those facilities contributing in any way to 100 octane gasoline production should be kept on stream maximum possible time.
>
> (2) Postpone shutdowns for routine inspection and maintenance as long as possible and minimize down time by every means at your disposal[.] A009601.

120. Consistent with the PAW directive to maximize avgas production, three avgas supply contracts (collectively, "Avgas Contracts") were entered into during the early stages of WWII regarding the production of avgas at the Baytown and/or Baton Rouge refineries. First, on January 13, 1942 DSC and the Standard Oil Company of New Jersey ("SONJ") entered into an avgas supply contract ("Master "Suppliers" Contract"). A000471–A000500. This contract provided that both Humble and Standard Oil were two of SONJ's "Suppliers" and therefore the avgas manufactured at both the Baytown and Baton Rouge refineries under contract with SONJ would be supplied by SONJ to DSC. A000472. The term of the contract was the time period of January 13, 1942 to February 28, 1946. A000484.

121. Second, effective February 4, 1942, DSC and Humble entered into an avgas supply contract regarding the production of avgas at the Baytown refinery for sale to DSC. A000501–A000518. This contract provided that Humble was one of SONJ's "Suppliers" of avgas for ultimate sale to DSC and further provided that Humble would make direct sales to DSC of avgas produced at the Baytown refinery. A000501. The term of the contract was the time period of February 4, 1942 to February 28, 1946. A000509.

122. Third, on February 16, 1943 Standard Oil and the DSC entered into a contract, which expressly incorporated by reference the terms and provisions in the Master "Suppliers" Contract, regarding the production of avgas at the Baton Rouge refinery for sale to DSC. A000519–A000520.

123. The Avgas Contracts dictated the specifications for the avgas to be produced. A000478–A000480.

124. PAW used telegrams to communicate day-to-day operational directives and instructions to Humble and Standard Oil, such as, for example, to maximize or modify production levels for avgas and other war products at the Baytown and Baton Rouge refineries, to prioritize the use of the allocated crude oil for the production of avgas and specific war products over other products, or to implement other production-related activities at the refineries. *See, e.g.*, PF ¶¶ 126, 130, 133.

125. PAW dictated specific production procedures, A000399; A000501–A000518, such as the production processing procedures that needed to be followed, the final actual composition of the avgas, and the specific color to dye the different types of avgas that the Baytown or Baton Rouge refineries were manufacturing. A000564–A000582; A000588.

126. In order to dictate the production levels of avgas and other war products, PAW regularly engaged in micromanagement of the Baytown and Baton Rouge refineries, as the following example illustrates. In August 1943, PAW instructed Humble via telegram to increase the production of two war products—motor gasoline and distillate fuel—by 2 to 3%, provided that such increases in yields did not result in a decrease in production of avgas and other critical war products. A009636–A009641.

127. In response, Humble informed PAW that compliance with these product yields would result in a minor reduction (about 0.03% or 50 B/D) in the production of codimer, an avgas blending component and a critical war product. Humble also noted that the production increase should be adopted because otherwise, the refinery would eventually run out of excess storage tank capacity for residual fuel oil, and if this occurred, it might be necessary to curtail crude oil processing as a whole at the refinery. A009636–A009637.

128. PAW rejected Humble's proposal to cut back the production of codimer, and in fact, PAW directed Humble to not decrease codimer production by 50 B/D but to make certain operational changes to increase codimer production by an additional 50 B/D, or an overall increase of 100 B/D. A009642; A009643; A009644. An internal PAW memorandum detailed the effect of this directive on the Baytown refinery production output as follows:

> According to Mr. Sauer [PAW's Assistant Director of Petroleum Supply] these items are additive and the net effect is that, to produce one hundred barrels more of 100 octane gasoline components, Humble is going to produce 15,000 barrels per day of residual fuel oil, which we do not need, and sacrifice 8,000 barrels of automotive gasoline, which we do need, and 7,000 barrels of distillate heating oil, which we do need. A009643.

129. Bruce Brown, PAW's Assistant Deputy Petroleum Administrator, responded to Humble's concerns regarding the imminent lack of storage capacity for the additional residual fuel oil being produced as a result of PAW's instructions as follows: "I am not a bit worried about that because there is plenty of storage available in the Gulf Coast, and until storage approaches the danger mark of fullness I think we should produce maximum 100 octane gasoline." A009643.

130. PAW regularly directed Humble and Standard Oil by telegram to maximize the production of avgas at the Baytown and Baton Rouge refineries, and in many of these telegrams PAW also periodically directed Humble and Standard Oil to maximize the production of one or more other war products (without reducing maximum quantities of avgas), depending on the specific requirements of the U.S. military at the time the telegram was issued, because various other petroleum products were vital to the war effort and required by the U.S. military as well, A000206–A000209 and A000216–A000218; and these other war products included, for example, the following:

a. Asphalt; A000590; A000408–A000409;

b. Navy fuel oil / other lubricating oils; A000593; A000411–A000412.

c. Diesel fuel; A000596; A000597–A000598; A000599.

d. Residual fuel oil; A000600–A000605; A000606.

e. Kerosene; A000408–A000409; A000410; A000607.

f. Toluene; A000593–A000595; A000408–A000409; A000410; and

g. Motor gasoline; A000608; A000609–A000611; A000612; A000613–A000616; A000617; A000618; A000619; A000620–A000621; A000521–A000522.

131. According to the Government report titled *The History of the Petroleum Administration for War*, PAW regulated and directed refinery operations for increasing production of other key "products for war" that were needed by the U.S. military or the Government for the war effort, and these "products for war" included 80-octane all-purpose gasoline; Navy special fuel oil and Navy diesel fuel oil; residual fuel oil; heating oil, kerosene, tractor fuels, and other distillates; lubricants; toluene; asphalt; and petroleum coke. A000206–A000209.

132. According to the Government report titled *The History of the Petroleum Administration for War*, 80-octane all-purpose gasoline, which was a type of premium motor

gasoline manufactured to specific Army specifications, was one of the "products for war," stating further that "[i]f 100-octane aviation gasoline was the war's No. 1 glamor product, there is no question that 80-octane all-purpose gasoline was the No. 1 'jack of all trades.'" A000206. This gasoline was specifically tailored for military use and "in March 1942, the Army made it known that it must have a very special kind of 80-octane, usable in all climates and temperatures." A000206–A000208.

133. In one of the PAW telegrams to Humble and Standard Oil directing the oil companies to increase their supply of this type of motor gasoline to the U.S. military, PAW described how motor gasoline was nearly as important as avgas in fueling the military's war effort, stating the following:

> The military procurement services cannot obtain commitments to supply more than a small portion of their requirements for 80-octane all purpose gasoline under specification 2-103B. Accordingly, it is necessary that you check immediately with each refiner who indicated ability to manufacture this product and find out why he is not offering gasoline meeting 2-103B to the Army, Navy, or Treasury procurement in sufficient quantities. . . . Steps will be taken by you or by this office to remove obstructions interfering with the manufacture of substantially the above total. If the handling of premium grade gasoline as a separate product is causing any trouble, premium can be eliminated from the market. If lack of crudes of required type and quantity is interfering, arrangements can be made to assign crude preferentially subject to the needs of higher priority products to those companies who will produce 80 all purpose gasoline of the new specification. <u>No compromise can be made with the requirements of the ground forces, since in the last analysis, it is just as important that the ground forces have motor fuel as it is for the air services to have aviation gasoline.</u> A000613; A000616. (underline added)

134. According to the Government report titled *The History of the Petroleum Administration for War*, Navy special fuel oil and Navy diesel fuel oil were "products for war," stating further in regard to Navy Special Fuel Oil that "[j]ust as 80-all-purpose was the work horse of the Army, so did Navy Special fuel oil bear the brunt of the burden at sea. The larger, heavier Navy boats operated almost entirely on this product," and in regard to Navy diesel fuel oil that "[t]he vastly expanding naval action in all parts of the world created a heavy demand for *special high-cetane Diesel fuel oil*." A000206; A000208.

135. According to the Government report titled *The History of the Petroleum Administration for War*, gas oils—one of the byproducts of crude distillation for avgas production—was one of the "products for war" because it was an important raw material for additional avgas production, stating further "[o]ne of the factors that made for uphill going was the fact that the charging stock, or raw materials, used in the catalytic cracking units is a middle-of-the-barrel product, known as gas oil, and gas oil ordinarily is part of the blend in heating oil. These catalytic crackers, together with certain reforming units, supplied base stock for 100-octane aviation gasoline, butadiene for synthetic rubber, and toluene for TNT; and so,

obviously the requirements for feed stock for them became progressively higher." A000206; A000208.

136. According to the Government report titled *The History of the Petroleum Administration for War*, residual fuel oil was one of the "products for war," stating further that "[r]esidual fuel oil, the heavy oil that is used primarily for industrial and railroad purposes, and for bunkering those ships not designed for Navy Special, fluctuated continually throughout the war from a position of feast to one of famine. . . . Frequent changes in refinery yields had to be made, therefore, to deal with the residual situation; now more, now less as the war situation varied." A000206; A000208.

137. According to the Government report titled *The History of the Petroleum Administration for War*, heating oil, kerosene and tractor fuels were "products for war," stating further that "[a]lthough generally speaking, supplies were consistently tight nation-wide, the Government-industry team was able throughout the war to meet all military and essential civilian requirements for distillates; the so-called 'middle of the barrel' products, such as household heating oil, kerosene, and tractor fuels." A000206; A000208.

138. According to the Government report titled *The History of the Petroleum Administration for War*, lubricants were "products for war," stating further that "[l]ate in 1942, when PAW received the military requirements for aviation engine oils and for heavy duty engine oils for ground and marine equipment, it was immediately evident that they could not be filled without seriously jeopardizing the supply of essential industrial and transportation lubricants. A lubricating oil advisory committee was appointed by PAW to work with it in meeting the situation. . . . As a result, all military and essential industrial requirements for aviation engine and heavy duty oils were filled when needed." A000206; A000208.

139. According to the Government report titled *The History of the Petroleum Administration for War*, asphalt was one of the "products for war," stating further that "[t]he tremendous expansion of airfield and factory construction, as well as many miles of access highway and intraplant pavement and the need for residual fuel oil, account for the inadequacy of asphalt production through the early stages of the war." A000206; A000208.

140. According to the Government report titled *The History of the Petroleum Administration for War*, petroleum coke was one of the "products for war," stating further that "[p]etroleum coke, as produced by intensive cracking operations by many refiners throughout the country, was the basis for a large percentage of the carbon used in the production of aluminum and silicon-carbon and in the refining of nickel and other important metals." A000206; A000208.

141. According to the Government report titled *The History of the Petroleum Administration for War*, new schedules for crude shipments to refineries had to be set whenever "PAW would add new products to its military 'essential' list." A000202. "It was no fault of anyone that this was the case; it was simply one of the inevitable complexities of war." A000206.

2. Price and Market

142. The price paid by DSC for the avgas manufactured at the Baytown and Baton Rouge Facilities was established under the Avgas Contracts, and any price adjustments for the avgas had to be officially approved by DSC. A000625–A000627.

143. The Government report titled "The Role of Defense Supplies Corporation in the Wartime Aviation Gasoline Program" set forth the following regarding the types of costs that DSC took into account in determining the prices paid for avgas by DSC under the avgas supply contracts during WWII:

> [t]he essence of these contracts for the purchase by DSC of aviation gasoline was the price to be paid. This price included cost of materials and cost of operations, royalties payable by the manufacturer to patent holders, certain allowances for depreciation, obsolescence, amortization and taxes, a profit factor, and the interest payable on their investment. A000643.

144. The Government report titled "The Role of Defense Supplies Corporation in the Wartime Aviation Gasoline Program" further set forth the following:

> [t]he annual profit or management fee *allowed by DSC* in the price it paid for aviation gasoline in the [standard avgas] contract was approximately six per cent of the capital investment. How the Government negotiators arrived at the six percent figure is not clear. It might be explainable on a historical basis as the amount of profit usually allowed manufacturers making goods under Government contract. A000647.

145. During WWII, DSC set prices for high-octane avgas that were below the pre-WWII prices for such products. A000585.

146. A 1943 PAW memorandum titled "Covering Activities of the Office of PAW in Connection with the Erection of Plants Needed for the Production of 100-Octane Gasoline" set forth the following regarding the pricing of 100-octane avgas:

> [w]hile prices agreed to are well below pre-war prices our objective has always been to recognize real differentials in estimated costs and *to concern ourselves, primarily with keeping down profits* rather than establishing uniform prices which hurt a high cost producer and benefit a low cost producer. A000585.

147. In 1942, Congress passed the Renegotiation Act of 1942, Pub. L. No. 77-528, 56 Stat. 226 (1942), to provide the statutory framework by which the President through his agencies could determine whether a war contractor had obtained excess profits on a government contract and to require a war contractor to refund to the Government any excess profits; in essence, the Renegotiation Act was passed expressly to provide the Government with a method of profit limitation in order to ensure that companies did not receive excess profits under their contracts. A000652–A000674; A000675–A000732.

148. At the height of WWII and pursuant to the Renegotiation Act of 1942, PAW conducted a determination as to whether excess profits were being realized by the Exxon predecessor companies based on the prices being paid by DSC for the production and sale of avgas, and PAW determined that no excess profits were being realized. A000733–A000752.

149. The entire amount of avgas manufactured at the Baytown and Baton Rouge refineries during WWII was purchased by DSC. A000625–A000627.

150. According to Government historical expert Dr. Jay L. Brigham, the Government possessed a monopsony over avgas during WWII, testifying as follows in deposition on February 8, 2013:

> Q. Did the federal government purchase all the avgas produced by the Bayt - Baytown and Baton Rouge refineries and preclude other buyers during World War II?
> A. You're thinking of the 100 octane?
> Q. Mm-hmm.
> A. Yes.
> Q. And -- that's why the government had a monopsony with respect to hundred octane avgas?
> A. Yes. A000755.

151. The price of the avgas was set at a 6% to 7% profit margin over the "base price" of the avgas, and therefore, the Government was aware that oil companies had to maximize revenues from all non-avgas petroleum byproducts or be at risk of having to ask the Government to increase their profit margins, that consequently would raise the price of the avgas. *Shell Oil Co. v. United States*, 130 Fed. Cl. 8, 35 (2017).

152. The Government was successful in containing the price of avgas, but this resulted in the manufacture and sale of increased non-avgas petroleum byproducts. *Shell Oil Co. v. United States*, 130 Fed. Cl. 8, 35 (2017).

3. Supply and Price of Raw Materials

153. PAW controlled the type and amount of crude oil and other raw materials sent to the Baytown and Baton Rouge refineries under the Planned Blending Program. A000283–A000293.

154. DPC supplied the primary raw materials—light, catalytically cracked naphtha and hot acid copolymer—for the production of hydrocodimer at the Hydrocodimer Plancor at the Baytown refinery and the hydrocodimer was subsequently used in the production of avgas. A000759–A000760.

155. DPC retained title to the light, catalytically cracked naphtha and hot acid copolymer throughout the hydrocodimer production process and the resulting hydrocodimer at the Hydrocodimer Plancor at the Baytown refinery. A000759–A000760.

4. Construction or Installation of Facilities, Machinery or Equipment

156. Early in WWII, PAW directed that standards governing refinery construction be re-examined with the purpose of reducing the need for critical war-related materials, such as steel. As a result, in 1943 the American Society of Mechanical Engineers issued the "American War Standard" governing, for example, the construction standards for pressure vessels, flanges, valves and gaskets. Some of the new war standards increased pressure ratings in pipes, which increased the potential for leaks and encouraged the use of cast iron, which is highly corrodible when subjected to moisture, and is also brittle and propagates cracks more easily than steel alloys. A003321–A003324; Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 34.

157. According to refinery operations and forensic waste issues expert Gregory Kipp, "[d]ue to the shortage of materials and labor, and the urgency of ramping up production, the Government expected the refineries to expand facilities and maximize production using cheap materials and the lowest quality equipment workable for the job. . . . In essence, the Government wartime requirements created ideal conditions that would not only create leaks during wartime itself, but leave a legacy of leaky, fouled, corroded, abraded and otherwise compromised equipment that produced leaks after the war." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 37.

158. In a PAW memorandum "To All Petroleum Refiners," PAW acknowledged that its policy was to permit only very limited construction work at refineries that was directly related to increasing the supply of war products, stating as follows:

> [u]p to the present time the Refining Industry has been essentially restricted to new construction work which represented the barest minimum which would achieve the end of supplying the most critical war products. This policy has been necessitated by the extreme demands for construction materials and construction labor which the war had placed upon the entire country's economy. A000781–A000782.

159. Louis R. Goldsmith—a PAW Refinery Division official from 1942 to 1944—testified in deposition *U.S./Shell Litigation* regarding PAW's mandatory approval process for new construction as follows:

> Q. Did PAW approve the -- have approval over industry proposals for construction.
>
> A. Oh, indeed. Absolutely. Nobody could build anything without PAW's concurrence and approval because, for one thing, you couldn't get any raw materials to build anything with unless PAW certified that it was essential. A000339–A000340.

160. According to *The History of the Petroleum Administration for War*, PAW recruited the vast majority of its staff from the oil industry, stating: "There was only one source where such men were available in the required numbers, namely, the oil industry. Consequently, this agency followed the policy from the start of recruiting technical, operating, and executive staff largely from men who had engaged extensively in petroleum operations, and

thus had an intimate familiarity with the problems involved. A003277–A003279. In addition, both a Baytown official (H. H. Baker) and a Baton Rouge official (M. J. Rathbone) served on PAW's Petroleum Industry War Council District III Refining Committee, and so should have been fully aware of PAW's policy limiting construction work at refineries. A002006; A002008.

161. This Government policy was also reported in trade journals, such as the *Oil & Gas Journal*, which reported that "under the restricted use of new metal in operating refineries, many practices are being resorted to which could be considered a retrogression in the art . . . [M]any replacements that are being made of worn or corroded pieces of metal salvaged from other parts of the plant and worked over by the welder and machinist." A003325–A003328.

162. PAW required Humble and Standard Oil to submit a PAW Form No. 30—"Application for Authority to Use Material / Application for Preference Rating or Allotment of Controlled Materials"—and obtain the PAW's approval prior to and with respect to any proposed construction of a new facility or other structure at the Baytown or Baton Rouge refineries that would involve steel, copper or other materials that the Government deemed "controlled materials" during WWII. A000783–A000784; A000786–A000787.

163. For example, Humble had to obtain PAW's approval to—at the company's own cost—install a steam line for the propane deasphalting and dewaxing units, construct an employee training facility, install a small vertical drum in the reactor charge line for the isomerization unit, install a storage tank to store muriatic acid, install a lighting fixture in an instrument repair shop, and install repair and maintenance equipment for repairing diesel engine equipment, at the Baytown refinery.

164. Given PAW's policy regarding restrictions on any new construction, in most instances whenever Humble or Standard Oil requested PAW's permission to conduct a construction or installation project at the Baytown or Baton Rouge refineries, PAW denied approval. A000786–A000787; A000788; A000789; A000790; A000791; A000792. For example, in July 1944, Humble asked PAW's permission for "installation of additional concrete surfacing on streets and the installation of extensions to the existing concrete road system within the…refinery." PAW reviewed the request and recommended that the WPB deny the preference rating for the needed materials stating: "[w]hile it is recognized that some alterations and extensions may be desirable…it is considered that these facilities are not required to maintain or increase the production of any essential wartime products. Therefore, it is recommended that this project be denied at the present time." A000793–A000794.

165. In contrast, when PAW desired the construction of facilities at a refinery, PAW tended to pressure the oil company to acquiesce. For example, PAW pressured Humble to allow the Hydrocodimer Plancor to be sited and operated in the middle of the Baytown refinery; however, Humble was "not receptive" to the siting of the hydrocodimer plant at the refinery because Humble believed the hydrocodimer plant would add further complications to an already congested refinery, and had no prospective post-war utility for Humble, particularly because one of its key raw materials—hydrogen—was dependent upon the operation of other war-related materials production units at the Baytown Facility. A000795–A000796; A000813–A000816; A000806–A000807; A000808–A000812; A000802–A000805; A000801.

166. In regard to the Hydrocodimer Plancor, PAW pressured Humble until it acquiesced to PAW's demands, expert Gravel testified to at his deposition on March 1, 2013 as follows:

> "Well, I think - - I think the chain of correspondence reflects that Humble did not want this particular plant to be built within its facility for a number of reasons. . . And the way I read the correspondence is that Humble basically said in the correspondence, we want to make it clear that we're not for this project. But if the government feels like this is a project that really needs to be done for the war effort, then will basically acquiesce and do it. A000821–A000822.

167. PAW admitted that Plancor 1909, the hydrocodimer plant constructed at Baytown, was constructed over Humble's reluctance and at PAW's "insistence." A000806. PAW took the position that "on several occasions that . . . we should not permit Humble to withdraw its priority application on this hydrogenation unit." A000806. Ultimately, Humble "realiz[ed] the urgent need for such an installation in the interest of maximum 100 octane aviation gasoline production [and] agreed to the construction of such a plant later known as Plancor 1909[.]" A000795–A000796.

168. Louis R. Goldsmith testified as follows regarding PAW's role in refinery construction:

> Q. What, if in the construction of a facility . . . a heat exchanger was needed to complete the facility or to progress with the production . . . would PAW have any role in that issue or that problem?
>
> A. Yes . . . they would certainly be looking at construction products and these plants all over the country, it was obvious they didn't all move at exactly the same pace, so within PAW there was an understanding as to the relative progress of various plants. And if there were some plant getting close to completion that still lacked a few critical items, then there would be, first of all, an attempt to move critical facilities that might have been programmed to go to Refinery A, and instead divert it to Refinery B in order to complete their job sooner. And then the other plant would have to be taken care of later.
>
> But this whole process was going on continuously between PAW and the refiners that were trying to build facilities and the War Production Board that had the ultimate control over . . . the rationing of all critical supplies.
>
> Q. So in our example of the heat exchange, if that was needed at Facility A, and at Facility B, and there was only one available, what role would PAW have there?
>
> A. Well, PAW would be working with the refiner and with the supplier of the heat exchanger and . . . PAW would be the one to say: Let's have the supplier of the heat exchanger ship it to Plant A rather than Plant B so as to get on with it. *PAW was very much in the middle of all of this process of getting things built.* A009615–A009616 (emphasis added).

5. Waste Processing

169. According to PAW official J. Howard Marshall, PAW's mandate that refineries maximize avgas production trumped any other operational issues at refineries, including waste disposal issues, testifying as follows in his 1991 deposition:

> Q. Mr. Marshall, what if a refinery came to PAW and said, "We're not producing any more of this 100 octane because we don't know what to do with this byproduct of sulfuric acid, this spent acid." What would you have done?
> A. Told him to make it anyway.
> Q. Because 100 octane is so important?
> A. That critical. A003267.

170. Given the paramount importance of maximizing avgas production, J. Howard Marshall further testified that the Government intended to underwrite any financial costs and risks that the oil companies incurred to implement the avgas program, further testifying as follows:

> Q. Certainly. Is it fair to say that the government knew that there would be tremendous costs involved in gearing up the industry and producing the 100 octane program and that the government was standing ready to underwrite the financing of that?
> A. Yes.
> Q. And that was - -
> A. We had no choice.
> Q. Because you needed the 100 octane.
> A. Exactly right. A003270.

171. In fact, according to J. Howard Marshall, the Government's policy to reimburse the oil companies for all of their costs of avgas production extended to waste disposal costs as well, testifying in deposition as follows:

> Q. And my question to you is this: If the oil industry executives had come to the War Production Board in response to this urging by Secretary Ickes and said, "We're going to produce it. We're going to produce the alkylate we need, but there's acid sludge there, are you going to pay for it?" is there any question but that the war production - but that the Petroleum Administration for War would have said, "If you can verify your costs, we'll take care of it"?
> A. Of course, we would. That was part of the program. A003322–A003323.

172. PAW approval was required before any significant waste processing improvements could be undertaken at the Baytown and Baton Rouge refineries. *See infra* PF ¶¶ 174–80.

173. According to the testimony of Government's historical expert, Dr. Jay Brigham, at his deposition on February 8, 2013, the Government was involved in virtually all aspects of waste operations—it made decisions regarding the construction and maintenance of the waste units and facilities, decisions regarding the adequacy or inadequacy of the waste units or facilities, and decisions regarding improvements to the waste units or facilities, as he testified as follows:

> Q. Did the government make any decisions regarding the design of waste processing units or waste processing facilities at the Baytown or Baton Rouge Facil- -- refineries?
> A. Yes.
> Q. Did the government make any decisions regarding the construction of waste processing units or waste processing facilities at the Baytown or Baton Rouge Refineries?
> A. Yes. They made – they made decisions about allocation of materials that would impact that, that – those things.
> Q. Did the government make decisions regarding the timing of the construction of new or modified waste processing units or waste processing facilities at the Baytown or Baton Rouge refineries?
> A. Yes. Again, through the allocation of process of material.
> Q. Did the government make decisions regarding the availability of critical materials necessary for the construction of waste processing units or waste processing facilities at the Baytown and Baton Rouge refineries?
> A. Yes. Again, as the – as the government's indu- -- nationwide war program, that did occur.
> Q. Did the government make decisions regarding the maintenance of waste processing units or waste processing facilities at the Baytown and Baton Rouge Facilities – refineries?
> A. Again, through the allocation of materials, that could impact that type of activity.
> Q. Did the government make decisions regarding the adequacy or inadequacy of the waste processing units or waste processing facilities at the Baytown or – and Baton Rouge refineries?
> A. Well, the – the decisions on the allocation material would have impacted the – the adequacies or the capabilities.
> Q. So is that a yes?
> A. I will say yes, answer yes, I should say.
> Q. Did the government make any decisions re- -- regarding the enlargement or other upgrades of the waste processing units and waste processing facilities at the Baytown and Baton Rouge refineries?
> A. Yes. A000756–A000757.

174. However, given PAW's policy of restricting new construction to only projects that directly increase wartime production, it was general knowledge that PAW would not divert resources for waste processing improvements; for example, a Humble engineer stated the following in this regard:

> [d]uring the war it was not possible to devote much technical manpower to the problem of effluent improvement since it was obvious that saving surface waters was secondary to saving men. A000823–A000824.

175. In fact, PAW employed its approval authority over the construction of waste processing improvements to generally deny approval of proposed waste processing improvements at numerous refineries nationwide; some examples of PAW's denial of waste processing improvements at other refineries include the following: (a) facilities to burn tank bottom sediments at an Oklahoma refinery; (b) a new oil/water separator and sewer system at an Ohio refinery; (c) a process water separator at an Indiana refinery to reduce pollution in Lake Michigan; (d) a wastewater oil/water separator at an Ohio refinery; (e) a cooling tower and related clean water system at a Kentucky refinery; and (f) an oil/water separator where existing separators were overloaded at a Pennsylvania refinery. Ex. 6, Att. D, Gravel 2014 Supp. Rpt. at 10–13.

176. In the "early part" of WWII, Standard Oil sought to install a large concrete master separator in part of Callaghan's Bayou at the Baton Rouge Facility, but due to material shortages, Government approval could not be obtained. A000829.

177. The purpose of such a Master Separator was to separate and remove oil and oily silt from the process wastewaters before their discharge into Callaghan's Bayou and ultimately the Mississippi River. A000829.

178. Later during WWII, in mid-1944, Standard again sought Government approval for the installation of a master separator, A000835, A000836, as well as the installation of a silt treating system, A000837, and construction of an office and laboratory for Standard's newly-formed Oil Conservation Department. A000837.

179. At that time, the U.S. Engineer Office had made the following determination regarding the Baton Rouge refinery: "[t]he disposal of the vast wastes from the refinery is into the Mississippi River and presents a serious problem. The enormous operations and rapid expansion of the plant have overloaded the waste disposal system to the extent that pollution of the Mississippi is a daily occurrence." and further stated "[w]ar activity has caused rapid expansion in plant facilities for production with no increase in waste disposal facilities. This has caused, as stated before, daily pollution of the Mississippi River." A000842. To solve this problem, the U.S. Engineer Office recommended the construction of a master separator, noting that the proposed master separator was the "key unit" necessary to prevent pollution of the Mississippi River, A000842, and further stating the following:

> [t]he project, including the separator, appears adequate to end pollution of the Mississippi River. It is believed that the urgency of construction is sufficiently necessary for the war effort that endorsement for approval by the P.A.W. and W.P.B. for the use of materials and labor for construction of the separator be given as requested. A000842.

180. On August 22, 1944, PAW notified Standard Oil that the agency was denying the company's request to construct the master separator on the grounds that "this project is not of

sufficient essentiality to the war program to warrant its installation at the present time and should be considered as a post-war project." A000844.

181. PAW did approve Standard Oil's request to construct the silt treating unit A000844, noting that the silt treating unit would recover oil that could be reused as industrial fuel for the Baton Rouge refinery. A000845-A000847. However, in approving the silt treating unit, it was clear that PAW did not consider the silt treating unit as an alternative or substitute for the Master Separator, and in fact PAW indicated that it would still be necessary for Standard Oil to construct the much larger Master Separator after the war, stating that "[t]he size of the facilities are also warranted because it would be impracticable not only from the standpoint of economics but also from the standpoint of the construction of materials and manpower to install silt treating equipment only for the existing water separators when it is apparent that the applicant will have to expand its oil water separators after the war." A000846. (underline added)

182. In regard to the Baytown refinery, in 1944 Humble submitted two PAW Form 30s to request PAW's approval for additional waste processing facilities to treat acid sludge waste generated by the production of avgas. Humble was concerned that its existing acid reconcentration facilities were inadequate to manage all the acid sludge waste being generated, and therefore, Humble did the following: (1) in the first PAW Form 30 Humble requested PAW's permission to construct new acid reconcentration facilities, and (2) in the second PAW Form 30 Humble requested PAW's permission to construct temporary acid burning facilities due to the possibility that the existing acid reconcentration facilities, which Humble planned to overhaul, would be inadequate to treat all the acid until the new acid reconcentration facilities were constructed. While it is unclear whether PAW approved construction of the new acid reconcentration facilities requested in the first PAW Form 30, PAW denied Humble's request for the temporary acid burning facilities in the second PAW Form 30, stating that if Humble delayed upgrading its existing acid reconcentration facilities, the refinery should not need the temporary acid burning facilities. A000783–A000784.

6. Other Operational Aspects

183. According to a 1943 PAW memorandum titled "Covering Activities of the Office of PAW in Connection with the Erection of Plants Needed for the Production of 100-Octane Gasoline," the PAW organized special governmental technical committees and periodically dispatched DSC engineers and U.S. military personnel to various oil refineries for reviews and inspections for the following purposes: (1) U.S. military officers reviewed and inspected the production schedules, (2) DSC engineers evaluated and resolved production process problems in order to optimize production levels, and (3) other DSC officials reviewed and examined invoices and accounting records concerning the refinery's operational costs for raw materials, labor costs and overhead. A000583–000589; A010278–A010292; A000869–A000870.

184. PAW and other Government war agencies conducted periodic onsite inspections of the Baytown and Baton Rouge refineries (as well as the Government Plancors) to review the performance of the refineries in meeting PAW directives for maximum production of avgas and other requirements, and these were very detailed inspections that often continued over several

days with formal inspection itineraries and specially-prepared materials regarding the refineries' operations. For example, in May and June 1943, Governmental officials from PAW and other agencies conducted a day-long inspection of the Baytown refinery and Plancors, and a multi-day inspection of the Baton Rouge refinery and Plancors to identify and direct facility construction, reconfiguration or operational changes that could further increase avgas and other war products production. A000872; A000894.

185. During WWII, PAW published a booklet of "recommendations for refinery inspections," prepared by the PAW in conjunction with the oil industry, which was intended for use by company refinery personnel. A003342.

B. The Government's Operational Control of the Refineries During the Korean War

186. Shortly after WWII ended, the demand for avgas nationwide decreased dramatically; for example, in 1946 a Government report projected that total, nationwide demand for avgas would be only approximately 72,000 B/D that year. A000933.

187. Then, a few years later, the Government's demand for avgas once again increased substantially beyond existing production capacities because the more advanced U.S. military aircraft being manufactured required higher grades of avgas and the Government's military need for greater avgas supplies increased with the Korean War looming. A000940.

188. On September 8, 1950, the U.S. Congress enacted the Defense Production Act of 1950 ("DPA"), Pub. L. No. 81-774, 64 Stat. 798 (1950). The DPA was modeled after the Second War Powers Act of 1942 and granted President Truman "robust legal authority . . . to force industry to give priority to national security production" and to seize or requisition facilities and equipment. A009655; A009657.

189. A legal historian of the Korean War period described the enactment and impact of the DPA as follows:

> The [DPA] of 1950 became law on September 8, 1950. This statute was modelled on the Second War Powers Act which had evolved during World War II. It granted to the President complete power to regulate every phase of industry and commerce, through the authority to allocate materials and facilities. No such authority has ever previously been granted by Congress except in time of all-out war. Emergency agencies, based largely on World War II models were speedily organized. A009664.

190. On September 9, 1950, by issuance of Executive Order 10161, President Truman delegated to the Secretary of the Interior the authority to "exercise his priorities and allocations powers in such manner as will in his judgment promote adequate supplies and their proper distribution," A000944, as well as the authority to requisition "any equipment, supplies…or materials or facilities necessary for the … national defense." A000948–A000972. This Order also delegated authority to the Secretary of Commerce to exercise the President's authority under the Defense Production Act of 1950 to set priorities and to allocate all materials and

facilities needed for production of war materials that were not otherwise delegated to other cabinet secretaries. A000944.

191. Pursuant to Executive Order 10161, the Department of Commerce created the National Production Authority ("NPA"), which carried out functions "relating to priorities and allocations" to meet defense needs. A009676.

192. According to a contemporary legal writer, the NPA re-established the WWII-era "Controlled Materials Plan" to control the allocation and use of critical materials, such as steel and copper:

> NPA, drawing heavily on the experiences of World War II, decided to adopt the Controlled Materials Plan, a quantitative scheduling plan designed to match up needs with supplies on an over-all basis to obtain balanced production. The control is exercised through three metals—steel, copper and aluminum—on the underlying assumption that by controlling the use of these key metals you can in fact control practically all production. A009686.

193. In 1950, the Military Petroleum Advisory Board's Aviation Fuels Committee recommended that an organization be established that would impose the same type of restrictions on the petroleum industry that were imposed by PAW during WWII, stating as follows:

> This is a drastic recommendation. It is a recommendation that will put the petroleum industry under the same type of restrictions as it operated under during World War II. It is almost inevitably going to transpire.
>
> If and when such an agency is set up, it will almost certainly go into more and more activities as it goes along. There is no such thing as a little bit of control. However, that does not alter the fact that the Aviation Fuels Committee, after full consideration, has felt and does feel that such controls are necessary if the Military is to be supplied with aviation gasoline. A000940.

194. On October 3, 1950, the Department of the Interior established the U.S. Petroleum Administration for Defense ("PAD"). A000943.

195. On December 16, 1950, by issuance of Executive Order 10193, President Truman created the Office of Defense Management ("ODM"). The order delegated to the ODM the President's authority under the Defense Production Act of 1950 to "direct, control and coordinate all mobilization activities of the Executive Branch of the Government including but not limited to production, procurement, manpower, stabilization and transport activities." A000973. PAD and the National Security Resources Board were placed under the authority of the Chairman of the ODM. A000973; A000944–A000947; A000974.

196. On January 3, 1951, by issuance of Executive Order 10200, President Truman established the Defense Production Administration ("DPA"), which operated under the

direction of the Chairman of the ODM. DPA was authorized to set priorities, make allocations, requisition materials and enter into agreements with industry and to "perform the central programming functions incident to the determination of the production programs required to meet defense needs." A000975. DPA was consolidated with the ODM by President Eisenhower under Executive Order 10433 on February 4, 1953. A000978.

197. According to a *History of PAD*, when the Department of Interior established the PAD pursuant to Executive Order 10161, it modelled the new agency after PAW. A009695; A009702.

198. The organizational structure of the PAD bore a striking resemblance to the structure of the PAW, as shown in a July 1952 PAD organization chart. The agencies shared the same functional divisions including production, natural gas, refining, supply and transportation, and distribution and marketing. District offices were established in New York, Chicago, Houston, Denver, and Los Angeles. A000981–A000982; A000176.

199. According to a news article in the *Oil & Gas Journal*, during the Korean War the PAD possessed the authority to do the following:

- Issue orders or directives to the petroleum and gas industry;
- Establish programs and policies relating to the operation of the petroleum and gas industries;
- Determine the requirements of various claimant agencies;
- Allocate petroleum and gas among said claimants, and under certain circumstances, to the public and industry in general;
- Develop and arrange for industrial operations, materials, manpower, procurements, financing, loans or other forms of assistance;
- Claim and arrange for the distribution of facilities and commodities as needed; and
- Requisition property as necessary. A000984.

200. By early 1951, the *National Petroleum News* reported that "PAD now stands on a footing virtually identical with that enjoyed by the last war's PAW." A000988.

201. According to an article in the *National Petroleum News*, by 1951 PAD exercised direct control over the production of avgas and avgas blending components, and assumed authority over the distribution and use of tetra ethyl lead ("TEL"), oil cracking catalysts, special inhibitors for gasoline, and lube oil additives. A000986.

202. In January 1951, PAD ordered oil companies to limit octane ratings for automobile gasoline. A000991.

203. In 1951, PAD issued Order No. 1, limiting TEL in automotive gasoline in order to make the chemical available for avgas, the military, and the needs of the national defense. A000992–A000995.

204. In mid-1951, PAD issued PAD Order No. 3, which restricted the use of blending agents and feed stocks by oil companies so that PAD could ensure the use of these raw materials in the manufacture of avgas "to the maximum extent practicable." A000996–A000999.

205. Other PAD directives in PAD Order No. 3 included the following:

> No refiner shall use any aviation quality blending agent, or deliver or receive any aviation quality blending agent for use, other than in the manufacture of finished aviation gasoline, except as expressly permitted by PAD….
>
> No refiner shall use any other blending agent, or deliver or receive any other lending agent or use, other than the manufacture of an aviation quality blending agent, except as expressly permitted by PAD….
>
> Every refiner shall use reasonable diligence to make use of aviation quality blending agents available to him in such manner as to assure manufacture of the maximum quantity of finished aviation gasoline of the grade or grades being manufactured. A000997–A000998.

206. PAD issued the following answers to questions regarding the degree of oil refineries' compliance to PAD Order No. 3 that would be required by PAD:

> Q. If I am currently using any alkylate in the manufacture of a fuel other than finished aviation gasoline, must I stop doing so?
> A. Yes….
> Q. If I am currently polymerizing any feed stocks and the polymer is not going to the manufacture of blending agents and I have available alkylation capacity, must I reduce the polymerization operation to the extent necessary to fill up my alkylation capacity?
> A. Yes….
> Q. Am I required to manufacture aviation gasoline from the alkylate I produce?
> A. No, but if you do not manufacture aviation gasoline, you may not make any other use except to sell the alkylate to another refiner who will manufacture finished aviation gasoline from it…. A001001–A001002.

207. The effect of PAD Order No. 3 on plant-level operations is illustrated by the following violation of the PAD directive by another oil company. According to a PAD memorandum, Sun Oil Company reported to PAD an "inadvertent violation of PAD Order No. 3," which involved an employee mistakenly turning "a valve on alkylate line and permitt[ing] 1500 barrels of alkylate to be diverted into motor gasoline." A009705.

208. PAD Order No. 3 required a refiner to seek approval from the PAD for even non-avgas production of minor amounts of avgas components as illustrated in the following example. According to a PAD letter dated May 18, 1953, PAD permitted Esso Standard Oil "an exception to PAD Order No. 3 which would allow [it] to supply the Standard Oil Development Company with alkylate for research work[.]" A009706.

209. Esso Standard Oil ("Standard Oil") sent the following telegram request to PAD:

> [The] excess costs material is supplied by us with the greatest reluctance . . . . All of our negotiations regarding cost and volumes of abnormal cost avgas have been carried out with your people and evaluations have been discussed in whatever detail your people have deemed it necessary. We do not believe it should be necessary, nor desirable from your standpoint, for us to deal with more than one Government Agency regarding detailed economics of abnormal costs avgas manufacture. We shall continue to supply necessary economic background information . . . as long as you believe it is necessary to request that we manufacture abnormal cost avgas, but respectfully suggest that requests for such information be channelled through your agency in the future. A009708–A009710.

210. Later in 1951, PAD issued PAD Order No. 4, which established the amount of TEL that could be used in the manufacture of avgas. A001004–A001005.

211. The purpose of PAD Order No. 4 was to set forth minimum quantities of TEL, which increases the octane level of gasoline, that may be used in commercial aviation gasoline so that greater quantities of high-octane blending stocks would be available for use in manufacturing military-grade avgas, and therefore, would "result in an increase in total supplies of aviation gasoline needed immediately for military and other essential uses." A001006.

212. U.S. military demands for avgas increased as the Korean War progressed, prompting J. Ed Warren—PAD's Deputy Administrator—to formulate a plan to compel Humble, Standard Oil, and other companies to further increase the production of avgas and avgas components. The plan indicated an intent by PAD to employ its seizure authority if necessary to ensure adequate military supplies of avgas, avgas components and other petroleum products. A009711–A009713.

213. Under the plan, PAD Deputy Administrator J. Ed Warren contacted by telephone the heads of major oil companies, including Humble and Standard Oil, to inform them that PAD would be contacting industry operating personnel to increase alkylate (i.e., an avgas component) and avgas production over these companies' then-current Government commitments. A009711–A009713.

214. According to J. Ed Warren, PAD preferred the oil companies to "take the bull by the horns" and determine ways to increase production. A009712–A009713. But, PAD also developed refinery operational changes to increase production and then would contact refinery operations personnel "through our usual channels" to review and implement such operational changes. In this regard, PAD stated as follows:

> PAD will also be developing ways and means of increasing production and we will be contacting industry's operating people through our usual channels. We will need the utmost cooperation from these people and the ways must be cleared for quick action. A009712.

215. PAD was prepared to seize refineries if necessary. J. Ed Warren stated as follows:

> The only other alternatives to increase production are to allocate aviation gasoline to commercial consumers of aviation gasoline or for the Military to make the same gasoline available to them by exercising their rights of seizure. A009711.

216. PAD also had the authority to requisition avgas from oil refineries. A009717. According to one scholar, this allowed PAD to control and limit the price charged for avgas because the threat prevented oil companies from "driving hard bargains." A009728.

217. J. Ed Warren stated in PAD's "plan of operation" that "[i]ndustry will have to 'stick its neck out' to get production started" in conformance with PAD's plan; otherwise, "[i]f industry fails to come through, PAD will have to take appropriate action." A009712–A009713.

218. A PAD internal memorandum detailed how its directives necessitated operations changes at refineries:

> In order to increase the supply of aviation gasoline, the Esso Standard Oil Company and its subsidiary, the Humble Oil Refining Company, have conducted various special operations at their respective refineries that have resulted in the production of additional Grade 100/130 and 115/145 avgas at higher than normal market prices. A009713.

219. In a telegram, Humble acknowledged PAD's authority to require adjustments and modifications to refinery operations:

> Adjustment[s] of operations at our Baytown Refinery to maximize production of high-octane aviation gasoline consistent with outstanding contracts for lower quality grades was initiated as soon as increased military demand was indicated. Alkylation facilities are being operated at maximum capacity. Other aviation facilities, including aromatic producing equipment, are being operated at full rating in [order to] supply blending agents to other refineries [for avgas production for the government]. A009745.

220. According to PAD Deputy Administrator J. Ed Warren, in the "plan of operation," PAD required the refineries to use more quality base stock for the production of avgas, but acknowledged that this program would hurt the quality of motor gasoline produced by these refineries, stating the following:

> We know that this program will hurt the motor gasoline quality. We do not want anyone to get hurt any worse than anyone else. We will do everything we can to equitably allocate this burden. A009712.

221. Correspondence from refiners to PAD demonstrated their frustration with the effect of PAD's directives on refinery operations, such as, for example, the following statement by one refiner in a letter to PAD:

> It is simply unbelievable that we would be "pushed around" (and I can't think of any other term) in this manner. . . . We have cooperated fully with P.A.D. in every way possible. Therefore, the situation as it exists today is simply beyond comprehension. A009774.

222. PAD required the Baytown and Baton Rouge refineries to increase alkylate production, as Humble details in a letter to PAD:

> The entire increase of finished aviation gasoline has been committed either directly or indirectly to government. Our Alkylation Plant is running at capacity, and during September manufactured an average of 8,440 B/D of alkylate as compared to peak monthly production average of 7,257 B/D during February, 1945 of World War II. This production required alkylation of all available propylene, butylenes, and amylenes after segregation of maximum catalytic butylenes for operation of the Baytown Butyl and Butadiene Plants at capacity. A009746.

223. In November 1951, PAD circulated a letter to all U.S. refineries producing avgas. This letter contained the military's requirements for avgas for the last half of fiscal 1952, but cautioned that, "the overall situation has deteriorated…the overall aviation gasoline supply situation will continue to be critical. ASPPA's[16] requirements for Grade 115/145 are considerably above the current level of production of this grade. You are requested to increase production of this grade to the extent of these requirements." A001009.

224. PAD directed the Baton Rouge refinery to produce 750,000 barrels of "abnormal cost" avgas from October through December 1951, and in internal Government correspondence explained the purpose of this directive as follows, "[t]hese activities are being resorted to, at the request of this office, in an effort to cover the current critical demand for aviation gasoline. The operating changes required to accomplish this incremental production are extremely complicated, involving large refineries in Baton Rouge, La., Baytown, Texas, Baltimore, Md., and Bayway, N.J." A001010.

225. In December 1953—a few months after the Korean War ended—the Baytown refinery's newsletter—*Baytown Briefs*—reported that "[u]ntil recently, practically all aviation gasoline production has been under Government control…. Now that the controls have been lifted, Humble can produce both top grades of aviation to meet a growing demand from commercial airlines." A001013.

---

16 *Armed Services Petroleum Purchasing Agency ("ASPPA")

IV. Baytown and Baton Rouge Government-Owned Plants

A. Baytown

1. Baytown Ordnance Works ("BOW")

226. Humble's "History of the Baytown Ordnance Works" reports that the Ordnance Department in 1939 "approached" Standard about producing nitration grade toluene for TNT. Wartime developments had "made it appear that the nitration grade toluene requirement would far exceed the quantity that could be made available from coke production" as of 1938. A001138. This led to the ultimate design and construction of the Baytown Ordnance Works ("BOW"). *Id.*

227. In February 1941, the War Department acquired from Humble a parcel of land that was adjacent to the Baytown refinery for the construction and operation of the BOW. A001016; A001072.

228. Under an operating contract, Humble constructed the BOW based on designs and specifications approved by the U.S. Army Ordnance Department ahead of schedule on this parcel of land and the plant was operated for the production of nitration grade toluene. A001017; A001144.

229. The BOW contained toluene-producing process facilities, numerous aboveground tanks, military barracks, a mess hall, air raid shelters, perimeter fencing and four guard watchtowers. A001073; A001090.

230. During the period of approximately 1941 to January 1946, the War Department was the owner of the BOW. A001016; A001105; A001106–A001109; A001107; A001126.

231. During the period of September 1941 to August 1945, the U.S. Army leased the BOW to Humble, and the plant operated under the management of Army Ordnance officials stationed at the plant. A001016; A001127–A001128; A001129; A001149.

232. The BOW's primary raw material was crude-sourced naphtha produced by the distillation of crude oil at the Baytown refinery, and the vast majority of the byproducts resulting from the BOW's processing of the naphtha into nitration grade toluene was returned to the Baytown refinery, as described by Humble in 1943 as follows:

> [i]n the process used, 50,000 B/D of naphtha from both crude and cracked sources are sent to the [BOW] plant from the refinery. This is subjected to superfractionation for the removal of 15,600 light naphtha and 12,700 of heavy naphtha, resulting in the production of 22,000 barrels of hydroformer feed. At the hydroformer the feed is vaporized, heated to approximately 1015°F, and passed through reactors containing a catalyst which converts certain components present in the feed to toluene but allows any toluene already present to pass through unchanged. The hydroformed product is then subjected to fractionation for the

> removal of light fractions and heavy fractions resulting in a feed to the extraction and purification unit in which all of the toluene has been concentrated. The extraction plant feed, amounting to 10,700 B/D and containing 42% toluene, is solvent extracted with liquid sulfur dioxide for the removal of toluene. The toluene-free Raffinate amounts to 5,200 barrels. The extract obtained is purified by a final distillation producing 4,500 B/D of an overhead product of nitration-grade toluene and approximately 1,000 barrels of heavy extract. Thus, the refinery furnishes 50,000 B/D of naphtha, and the finished toluene is equivalent to only 9% of this quantity. The other 91% is returned to the refinery in the form of byproducts from the toluene manufacturing operation. A000883–A000884.

233. During its first year of operation, the BOW produced more than double its original capacity of nitration grade toluene for TNT and quadrupled the entire Nation's production in its first year; and during WWII, the BOW accounted for over 40 percent of the Nation's nitration grade toluene production. A001152–A001153; A001129.

234. The wastes generated by the BOW operations included spent acid sludge, spent alumina catalyst, and oily acidic wastewater effluent. A001150; A001155; A001024; A001112; A001126.

235. The wastewaters generated by the BOW were processed in the refinery's waste processing facilities; specifically, these wastewaters were conveyed by a 36-inch concrete sewer line to the refinery sewer system, which emptied into an earthen ditch—called the West Drainage Ditch—which transported the wastewaters to the refinery's separators system for treatment. A002030.

236. The spent alumina catalyst waste was disposed of in at least three dumps at or adjacent to the BOW—a "West Side Dump," "South Dump," and a disposal area along the railroad tracks at the BOW. A001156; A001157–A001158.

237. The Ordnance Department of the U.S. Army knew that some, if not most, of the spent alumina catalyst waste generated at the BOW was disposed of in open dumps at the Baytown Facility. A001159; A001157–A001158; A001160–A001161; A001162–A001164; A001165; A001156; A001166.

238. The War Assets Administration sold much, but not all, of the BOW facilities and equipment, to Humble in October 1946; however, Humble intended to greatly decrease the production of toluene at the purchased BOW facilities and instead convert the facilities to the production of gasoline components. A001106–A001109; A001112; A001126.

2. Butadiene Plancor

239. In 1942, DPC acquired a parcel of land adjacent to the BOW from Humble for the construction and operation of a butadiene plant identified by DPC as "Plancor 485" or "SR-10" ("Butadiene Plancor"). A001167.

240. The RuR intentionally sited Plancor 485 adjacent to the Baytown refinery in order to utilize butylenes, which was a byproduct of the refinery operations, as a raw material at Plancor 485. A003348.

241. As the designated "agent" for DPC, Humble constructed the Butadiene Plancor based on designs and specifications approved by the DPC on this parcel of land. A001180–A001214; A001167–A001168.

242. During the period of 1942 to April 1955, DPC was the owner of the Butadiene Plancor and leased it to Humble. A001170; A001215–A001216; A001217–A001250; A001251–A001285; A001287.

243. Under an operating contract, the Butadiene Plancor operated as a Government-owned Plancor during the time period of August 1943 to April 1955 and RuR determined that the plant would be used for the production of butadiene—a key raw material in the production of synthetic rubber—at specifications, productions levels and prices set by the RuR. A001180–A001214; A001289; A001254; A001217–A001250.

244. The wastes generated by the operation of the Butadiene Plancor included oil slop, quench oil emulsion and steam condensate, which contains tertiary butyl alcohol and caustic acids, copper ammonium acetate, and boiler blowdown waste. A001296–A001297; A001304.

245. According to an industrial waste audit report prepared by Sheppard Powell—a consultant retained by the RuR—most of the wastewaters generated by the Butadiene Plancor were discharged into Scott's Bay, but due to the inadequate nature of its own waste processing facilities, some specific waste streams, including quench oil emulsions, steam condensate containing tertiary butyl alcohol, slop oil and separator sludge, were conveyed to the refinery waste processing facilities for treatment and disposal. A001295–A001304; A001305–A001309.

246. The Government sold the Butadiene Plancor to Humble in April 1955. A001251–A001285; A001287.

3. Butyl Rubber Plancor

247. In 1942, DPC acquired a parcel of land adjacent to the BOW from Humble for the construction and operation of a butyl rubber plant identified by DPC as "Plancor 1082" or "SR-43" ("Butyl Rubber Plancor"). A001317.

248. As the designated "agent" for DPC, Humble constructed the Butyl Rubber Plancor based on designs and specifications approved by DPC on this parcel of land. A001317–A001346; A001317–A001318.

249. During the period of 1942 to April 1955, DPC was the owner of the Butadiene Plancor and leased it to Humble. A001320; A001347–A001348; A001287.

250. Under an operating contract, the Butyl Rubber Plancor operated as a Government-owned Plancor during the time period of February 1944 to April 1955, and RuR

determined that the plant would be used for the production of butyl rubber at specifications, productions levels and prices set by the RuR. A001317–A001346; A001349–A001354.

251. The wastes generated by the Butyl Rubber Plancor operations included tertiary butyl alcohol, caustic soda, sulphuric acid, aluminum chloride, rubber polymer, naphtha, zinc stearate and lubricating oils. A001295.

252. According to an industrial waste audit report prepared by Sheppard Powell—a consultant retained by the RuR—most of the wastewaters generated by the Butyl Rubber Plancor were discharged into Scott's Bay, but due to the inadequate nature of its own waste processing facilities, some specific waste streams, including naphtha waste, slop oil and floating rubber polymer, were either conveyed to the refinery waste processing facilities for treatment and disposal or disposed of in waste units at the refinery. A001309–A001408.

253. The Government sold the Butyl Rubber Plancor to Humble in April 1955. A001399–A001408; A001287.

4. Copolymer (Styrene) Plancor

254. In late 1942, DPC acquired a parcel of land adjacent to the site of the Butadiene Plancor from Humble for the construction and operation of a copolymer (styrene) synthetic rubber plant identified by DPC as "Plancor 877" or "SR-40" ("Copolymer Plancor"). A001417; A001467–A001474.

255. The Goodyear Tire & Rubber Company constructed the Copolymer Plancor at the site acquired by DPC from Humble. A001467–A001474.

256. The Copolymer Plancor had an initial capacity of 30,000 long tons of synthetic rubber per year, but its capacity subsequently increased to 44,000 long tons of synthetic rubber per year. A001479.

257. During the period of February 1943 to May 1955, DPC was the owner of the Copolymer Plancor and leased it to The General Tire & Rubber Company. A001481–A001487; A001479; A001492.

258. The Copolymer Plancor operated as a Government-owned Plancor during the time period of July 1943 to May 1955. A001479; A001494; A001495–A001497.

259. The wastes generated by the Copolymer Plancor operations included boiler blow down waste and sludge, sludge from brine purification, spent caustic containing T.B.C. from butadiene purification, wastewater from the carbon black plant, liquid wastes containing mercaptans, salts, antioxidants, caustic soda, fatty acids, latex, styrene, oil, decanter water, rubber crumbs, carbon black, and sulphuric acid. A001498.

260. According to an industrial waste audit report prepared by Sheppard Powell—a consultant retained by the RuR—the wastewaters generated by the Copolymer Plancor were discharged into Scott's Bay. A001498–A001509.

261. In May 1955, DPC sold the Copolymer Plancor to the United Carbon Company. A001492.

5. Hydrocodimer Plancor

262. In 1943, DPC acquired a parcel of land within the Baytown refinery from Humble for the construction and operation of a hydrocodimer production plant identified by DPC as "Plancor 1909" ("Hydrocodimer Plancor"). A001510.

263. As the designated "agent" of DPC, Humble designed and constructed the Hydrocodimer Plancor on the parcel of land acquired by DPC. A001532–A001559.

264. The purpose of the Hydrocodimer Plancor was to manufacture hydrocodimer—an avgas blending stock. A001533.

265. During the period of June 1944 to October 1946, DPC was the owner of the Hydrocodimer Plancor and leased it to Humble. A001515.

266. The Hydrocodimer Plancor operated as a Government-owned Plancor during the time period of August 1944 to August 1945. A001532–A001559; A001560–A001561.

267. Pursuant to the "Operating Contract" for the Hydrocodimer Plancor, the DSC provided several of the plant's primary raw materials—light, catalytically cracked naphtha and hot acid polymer—for the production of the hydrocodimer, but retained title to these raw materials throughout their processing and the resulting hydrocodimer as well that was then sold and delivered to other refineries. A001532; A001533; A001549; A000796–A000797.

268. The wastes generated by the Hydrocodimer Plancor included oily wastewaters, and they were treated in the refinery's waste processing facilities, but only after PAW approved Humble's request to modify the sewer lines in the vicinity of the Plancor so that these wastewaters could be conveyed to the West Drainage Ditch which in turn conveyed them to the refinery's separators system. A000848–A000851.

269. The Government sold the Hydrocodimer Plancor to Humble in October 1946. A001566; A001567–A001586; A001587–A001588.

B. Baton Rouge

1. Butadiene Plancor

270. In 1941, DPC acquired a parcel of land near the Baton Rouge refinery for the construction and operation of a butadiene plant identified by DPC as "Plancor 152" or "SR-29, SR-397 and SR-486") ("BR Butadiene Plancor"). A001591.

271. The RuR intentionally sited Plancor 152 adjacent to the Baton Rouge refinery in order to utilize butylenes, which was a byproduct of the refinery operations, as a raw material at Plancor 152. A003348.

272. As the designated "agent" for DPC, Standard Oil constructed the BR Butadiene Plancor based on designs and specifications approved by DPC on this parcel of land. A001060; A001642–A001644.

273. During the period of 1942 to April 1955, DPC was the owner of the BR Butadiene Plancor and leased it to Standard Oil. A001644.

274. Under an operating contract, the BR Butadiene Plancor operated as a Government-owned Plancor during the time period of April 1943 to August 1947, and again from September 1950 to April 1955, and RuR determined that the plant would be used for the production of butadiene. A001604; A001653; A001671; A001672. The BR Butadiene Plancor produced at least 149,000 short tons of butadiene during its period of operation. A001675; A001672; A001672.

275. The wastes generated by the BR Butadiene Plancor operations included oil emulsions, sulphuric acid esters, copper ammonium acetate, ammonium hydroxide, oily water, and other wastewaters containing oil emulsions and soluble copper. A001679–A001686.

276. According to an industrial waste audit report prepared by Sheppard Powell—a consultant retained by the RuR—the process wastewaters generated by the BR Butadiene Plancor were discharged into Monte Sano Bayou, A001679–A001686, but some specific waste stream, including slop oil and oil emulsions, were sent to the Baton Rouge refinery for treatment; specifically, these wastes were collected from process flows as well as the gravity oil/water separator in Tank 1988 at the Plancor tank farm, A001686, and then conveyed by pipeline to a slop oil line northwest of Tank 783 at the refinery. A001690; A001697. Then, beginning in late 1946 an emulsion treating unit was constructed in the refinery's waste processing facilities to further treat these wastes from the Plancor. A001703–A001720.

277. During at least the period of approximately 1947 to 1955, oil-laden silty wastewaters generated by the Butadiene Plancor were treated in the silt treating unit at the refinery, and the resulting slurry containing oil was disposed of in the Old Silt Pond. Specifically, the Butadiene Plancor (as well as the Butyl Rubber Plancor) stored their oil-laden silty wastewater in the Chemical Pond, which was an earthen separator in the north part of the Facility. The oily silt in the Chemical Pond was then conveyed to the silt treating unit in the refinery to treat the silt and remove most of the oil, but the resulting slurry did contain a small amount of oil and was transported to the Old Silt Pond for settling and separation of the remaining oil. A003351–A003359; A002204–A002207; A003360; A002209; A003363; A003364; Ex. 6, Att. B, Gravel 2012 Rpt. at 203–04; 215.

278. The Government sold the BR Butadiene Plancor to the Copolymer Corporation in April 1955. A001605.

2. Butyl Rubber Plancor

279. In 1942, DPC acquired an unfinished plant on a parcel of land adjacent to the Baton Rouge refinery for the construction and operation of a butyl rubber plant identified by DPC as "Plancor 572" or "SR-15" ("BR Butyl Rubber Plancor"). A001721.

280. As the designated "agent" for DPC, Standard Oil constructed the BR Butyl Rubber Plancor based on designs and specifications approved by DPC on this parcel of land. A001732; A001721.

281. During the period of 1942 to April 1955, DPC was the owner of the BR Butyl Rubber Plancor and leased it to Humble. A001721.

282. Under an operating contract, the BR Butyl Rubber Plancor operated as a Government-owned Plancor during the time period of December 1942 to April 1955, and RuR determined that the plant would be used for the production of butyl rubber at specifications, productions levels and prices set by the RuR. A001732; A001782–A001783.

283. The BR Butyl Rubber Plancor produced approximately 315,000 long tons of butyl rubber and limited amounts of several other war products during its period of operation. A001787; A001789; A001783.

284. The wastes generated by the BR Butyl Rubber Plancor operations included sulphuric acid waste, acid and caustic wastes, acetone and isoprene wastes, rubber polymer crumbs, aluminum chloride, undissolved oily rubber waste, slop oil, other solid wastes containing zinc stearate, rubber crumbs and phenol beta naphthaline, and wastewaters containing sulphuric acid, caustic wastes, oils, acetone, tertiary butyl alcohol, and rubber crumbs. A001792–A001802.

285. According to an industrial waste audit report prepared by Sheppard Powell—a consultant retained by the RuR—the wastewaters generated by the BR Butyl Rubber Plancor were discharged into Monte Sano Bayou and much of the solid waste was treated and/or disposed of in landfills, burning pits and other land-based waste disposal units in the western part of the refinery. A001792–A001802.

286. Some of the wastes, including slop oil and polymer wastes, generated by the BR Butyl Rubber Plancor were sent to the refinery waste processing facilities for treatment and disposal. A001687–A001690.

287. During at least the period of approximately 1947 to 1955, oil-laden silty wastewaters generated by the Butyl Rubber Plancor were treated in the silt treating unit at the refinery, and the resulting slurry containing oil was disposed of in the Old Silt Pond. Specifically, the Butyl Rubber Plancor (as well as the Butadiene Plancor) stored their oil-laden silty wastewater in the Chemical Pond, which was an earthen separator in the north part of the Facility. The oily silt in the Chemical Pond was then conveyed to the silt treating unit in the refinery to treat the silt and remove most of the oil, but the resulting slurry did contain a small amount of oil and was transported to the Old Silt Pond for settling and separation of the remaining oil. A003351–A003359; A002204–A002207; A003360; A003366; A003363; A003364; Ex. 6, Att. B, Gravel 2012 Rpt. at 203–04; 215.

288. The Government sold the BR Butyl Rubber Plancor to Standard Oil in April 1955. A001782–A001783.

3. Catalyst Plancor

289. In 1943, DPC acquired a parcel of land that was within the confines of Plancor 572 for the construction and operation of a catalyst plant identified by DPC as "Plancor 1526" or "SR-158." The dehydrogenation catalyst was to be used in the production of butadiene at Plancor 152. A001803.

290. DPC was the owner of this Plancor, A001819, which operated during the time period of December 1943 to March 1944. A001467–A001474.

291. In 1950, the plant was dismantled and the land was transferred back to the account of Plancor 572. A003376.

4. Butadiene Conversion Plancor

292. In 1943, DPC arranged for the construction of a butadiene conversion plant within the Baton Rouge refinery on land owned by Standard Oil and using facilities and equipment owned by DPC. DPC identified the plant, which was used for the production of butadiene, as "Plancor 1355" or "SR-123." A001886–A001923.

293. This Plancor operated during the time period of April 1943 to December 1948. A001877–A001885.

294. The operation of this Plancor was dependent on the refinery for raw materials, utilities and sewers for conveyance of wastewaters, and used the refinery waste processing system for the treatment and disposal of its wastes; in fact, DPC's "Engineer's Final Report" stated the following, "Plancor 1355 effluent water enter[s] the refinery storm sewer and oil sewer systems at several points." A003384; A003391.

295. The Government sold the facilities and equipment comprising this Plancor to Standard Oil in January 1949. A001926.

5. Avgas Blending Components Plancor

296. In 1942, DPC acquired a parcel of land that was near the Baton Rouge refinery for the construction and operation of a plant that ultimately was used to manufacture avgas blendings components and was identified by DPC as "Plancor 1065." A001931.

297. DPC was the owner of the plant and it operated from approximately May 1944 to May 1945. A001937.

298. In 1950, Standard Oil bought the underlying parcel of land but not the plant itself which a third party dismantled and unsuccessfully attempted to sell to other parties. A001944.

6. Hydrogenation Plancor

299. In 1943, DPC arranged for the construction of a hydrogenation plant within the Baton Rouge refinery on land owned by Standard Oil and using facilities and equipment owned

by DPC. This plant, which was used for the production of hydrogenation products (i.e., avgas components), was identified by DPC as "Plancor 1868." A001957; A001959; A001964.

300. This Plancor operated during the time period of December 1943 to September 1945. A001957; A001959; A001964.

301. In October 1949, Standard Oil purchased the plant. A001987.

C. The Integration of the Government-Owned Plants and the Refineries

1. Sharing of Products and Byproducts for Use as Raw Materials

302. A Government report described the initial selection of the Baytown and Baton Rouge refineries (and another refinery) as three sites for butadiene plants:

> The three plants were to use butylene feedstocks which were to be supplied by their operating companies from nearby refineries. The butylenes were produced along with a number of other products in the refineries. A009799.
>
> The initial plant locations were selected because of their proximity to the manufacturing facilities and personnel of the respective companies[.] A009802.

303. In a 1942 internal PAW document, the PAW's Director of Refining emphasized how the new Government Plancors were not only to be integrated with the refineries but reliant upon them for most key raw materials, stating "[t]he raw materials used as charging stock to the new facilities comprise gases derived from other refinery field and plant operations. Therefore, the overall facilities are integrally interspersed throughout the oil company's properties and cannot be claimed as isolated units." A003396–A003399.

304. At both the Baytown and Baton Rouge Facilities, the refinery manufactured various products or byproducts that were used as raw materials at one or more of the Government-owned plants, and vice versa. *See infra* PF ¶¶ 305–07.

305. Examples of the sharing of products and byproducts at the Baytown Facility include the following: (a) the refinery supplied the primary raw material—naphtha—that was necessary for the processing of most of the toluene manufactured at the BOW, A000401; (b) the refinery supplied the Butadiene Plancor with gas oil that was used as an oil quench for the production of butadiene, A001991; (c) the refinery supplied the Butyl Rubber Plancor with a butane-butylene stream, which had been produced in the refinery's catalytic cracking operations, that was processed in the Butyl Rubber Plancor's isobutylene extraction unit for the removal of the isobutylene and then sent to the Butadiene Plancor for processing into butadiene, A001223; A001359; A001992; (d) all of the byproducts resulting from the nitration grade toluene production operations at the BOW were sent back to the refinery for various uses, A000401; (e) the Butyl Rubber Plancor supplied the refinery with spent butane and an isobutylene dimer stream for use in the production of avgas, A001362; (f) the Butadiene Plancor supplied the refinery with a mixture of polymer, butanes and n-butylene for use in the

production of avgas, A001223; (g) the BOW and the Butadiene Plancor supplied the Hydrocodimer Plancor with one of their byproducts—hydrogen, A000795–A000796, and (h) the Hydrocodimer Plancor supplied the refinery with hydrocodimer for the production of avgas. A000795–A000796.

306. Examples of the sharing of products and byproducts at the Baton Rouge Facility include the following: (a) the refinery supplied crude pentane, butylene, and butane-butylene to the Butyl Rubber Plancor, A002002; Ex. 6, Att. B, Gravel 2012 Rpt. at 154–56; (b) the Butyl Rubber Plancor supplied the refinery with spent C_5 fractions and butane-butylene fractions, A002002; Ex. 6, Att. B, Gravel 2012 Rpt. at 154–56; (c) the refinery supplied the Butadiene Plancor with toluene, butylenes and diolefins, Ex. 6, Att. B, Gravel 2012 Rpt. at 147–49; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 29–30; (d) the Butadiene Plancor supplied the refinery with butane and tail gas, Ex. 6, Att. B, Gravel 2012 Rpt. at 147–49; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 29–30; (e) the refinery supplied naphtha feedstock to the Butadiene Conversion Plancor, A002006–A002007; (f) the Butadiene Conversion Plancor supplied the refinery with various byproducts, including aromatic naphtha, heavy residue fuel oil and fuel gas, Ex. 6, Att. B, Gravel 2012 Rpt. at 155; and (g) the refinery supplied virgin naphtha to the Avgas Blending Components Plancor, A002011–A002013; A002021; A002023; Ex. 6, Att. B, Gravel 2012 Rpt. at 157–58; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 26; and (h) the Avgas Blending Components Plancor supplied the refinery with various avgas components, such as isopentane and isohexane. A002011–A002013; A002021; A002023.

307. According to expert Kipp, "the Government's munitions and synthetic rubber Plancors were—necessarily and by design—intimately connected to the petroleum refining operations at Baton Rouge and Baytown. This fact is highlighted in the 1943 PAW report as a partial basis for connecting munitions and rubber to refineries, because the refinery operations provide the base materials for the latter operations." Ex. 2, Att. B, Kipp 2016 Rpt. at 10.

2. Reliance Upon the Refinery's Waste Processing Facilities

308. The Government's Report on the Rubber Program indicated that the Government only required that its design and construction of the synthetic rubber Plancors meet minimum waste handling requirements:

> In common with many of the war-built facilities, the plants of the rubber program were constructed with the least possible expenditure in time, labor and money. As a natural consequence of this approach, adequate facilities for handling trade waste disposal were not, in all cases, provided. A009789.

309. A number of waste streams generated by the BOW or the Plancors at Baytown were treated and disposed of in the Baytown refinery waste processing facilities, including the following: (a) BOW—its wastewaters were processed in the refinery's waste processing facilities; specifically, these wastewaters were conveyed by a 36-inch concrete sewer line to the refinery sewer system, which emptied into an earthen ditch—called the West Drainage Ditch—which transported the wastewaters to the refinery's separators system for treatment; A002030; Ex. 6, Att. B, Gravel 2012 Rpt. at 157-58; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 26; (b)

Butadiene Plancor—its quench oil emulsions, steam condensate containing tertiary butyl alcohol and caustic, slop oil waste and sludge, were conveyed to the refinery waste processing facilities for treatment and disposal; A001295–A001304; A001305; A001310–A001316; Ex. 6, Att. B, Gravel 2012 Rpt. at 105 and 108; (c) Baytown Butyl Rubber Plancor—its naphtha waste, slop oil and floating rubber polymer, were either conveyed to the refinery waste processing facilities for treatment and disposal or disposed of in waste units at the refinery; A001399–A001408; Ex. 6, Att. B, Gravel 2012 Rpt. at 106–08; and (d) Hydrocodimer Plancor—its oily wastewaters were conveyed to the refinery's separators system; A001562–A001565.

310. A number of waste streams generated by the Plancors at Baton Rouge were treated and disposed of in the Baton Rouge refinery waste processing facilities, including the following: (a) Baton Rouge Butadiene Plancor—its slop oil and oil emulsions were sent to the refinery for treatment; A001697; A001703–A001720; Ex. 6, Att. B, Gravel 2012 Rpt. at 108; A001690; (b) Baton Rouge Butyl Rubber Plancor—its slop oil and polymer wastes were sent to the refinery for treatment, and much of its solid waste was treated and/or disposed of in landfills, burning pits and other land-based waste disposal units in the western part of the refinery; A001687–A001690; A001792–A001802; Ex. 6, Att. B, Gravel 2012 Rpt. at 108; and (c) Baton Rouge Butadiene Conversion Plancor—its wastes and wastewaters were processed in the refinery's waste processing facilities, A001852–A001859.

3. Reliance Upon the Refinery's Other Infrastructure

311. A significant part of the BOW's infrastructure was located within the refinery itself; for example, the BOW equipment for treating naphtha with acid and caustic was located in the refinery, and approximately a dozen of the BOW's large aboveground storage tanks were located at the refinery's tank farms in and around the refinery. A002028; A002029.

312. The various Government plants relied upon the refinery's storage tanks, pipelines, sewer systems, steam generating and distribution facilities, water supply, docks, roads and railroads. Ex. 8, Att. B, J. Johnson 2012 Rpt. at 48–51. In fact, several of the Plancors, including the Hydrocodimer Plancor at Baytown and the Butadiene Conversion Plancor and Hydrogenation Plancor at Baton Rouge, were constructed in the middle of the refinery and were dependent on the refinery's infrastructure, such as sewers and utilities, for their operation. A001957; A001959; A001964; A001852; A001859. The operation of much of this refinery infrastructure used and relied upon by the Government's plants also contributed to the historical contamination at these Facilities; according to refinery waste processing expert Jere Johnson, "many of these infrastructure facilities, systems and types of equipment generated wastes or had spills and leads resulting in wastes or contamination of soil, groundwater and surface waters and sediments." Ex. 8, Att. B, J. Johnson 2012 Rpt. at 51.

D. The Government's Operational Control of the BOW and Plancors

1. Products and Production Levels

313. Throughout WWII the U.S. Army Ordnance Department required the BOW to produce as much toluene as possible for the U.S. military. A002053.

314. Under the operating contracts for the synthetic rubber Plancors, the RuR possessed the authority to determine the products to be manufactured and their production levels at the synthetic rubber Plancors at both Facilities, *see* PF ¶ 16, and pursuant to this authority directed Humble or Standard Oil to increase production levels as necessary; for example, in one telegram to Humble, RuR directed Humble to triple the amount of butyl rubber manufactured at the Butyl Rubber Plancor, stating the following in the telegram to Humble: "take all necessary steps including those related to the purchase of materials, machinery and equipment to effect an increase in the capacity of the above butyl rubber project from 20,000 tons per annum to 60,000 tons per annum." A002073.

315. The DPC determined the products to be manufactured at the other Government-owned Plancors at the Facilities. *See* PF ¶ 14; Table 1, Baytown Plancors; Table 2, Baton Rouge Plancors.

2. Price and Market

316. The operating contracts for the synthetic rubber plants at both Facilities provided that RuR was the sole purchaser of the manufactured products at prices established under the contracts or would designate that the product be shipped to another Plancor (e.g., butadiene manufactured at the Butadiene Plancor at Baytown was required to be sent to the adjacent Copolymer Plancor for processing into synthetic rubber). A001319.

3. Supply and Price of Raw Materials

317. DPC arranged for the processing of light, catalytically cracked naphtha and hot acid copolymer into hydrocodimer at the Hydrocodimer Plancor at Baytown, and retained title to these raw materials throughout the process, and also determined the price to be paid for these raw materials. A001533–A001534; A001549; A000797.

318. The United States paid for and retained ownership of the alumina catalyst (i.e., caustic soda) used or partially used as a raw material at the hydroformer reactor processing unit at the BOW. A001159; A001157–A001158; A001160–A001161; A001162–A001164; A001165; A001156; A001166.

4. Construction or Improvement of the Facilities and Equipment

319. The Government's policy was to reduce all construction related to the Plancors "to the absolute minimum necessary for the war effort" and therefore, Government approval was required for all such projects, and to obtain approval the following criteria had to be met:

> "4. (a) It is essential for the war effort.
>
> (b) Postponement of construction would be detrimental to the war effort.
>
> (c) It is not practicable to rent or convert existing facilities for this purpose.

> (d) The construction will not result in duplication or unnecessary expansion of existing plants or facilities now under construction or about to be constructed.
>
> (e) All possible economies have been made in the project, resulting in deletion of all non-essential items and parts.
>
> (f) The structure of the project has been designed of the simplest type, just sufficient to meet the minimum requirements. . . .
>
> 5. Priority of materials - In general, all construction shall be of the cheapest, temporary character with structural stability only sufficient to meet the needs of the service which the structure is intended to fulfill during the period of its contemplated war use. Ordinary wood frame construction is preferable to reinforced concrete, and reinforced concrete is preferred to steel." A003428–A003431.

320. Humble had to obtain the approval of the Ordnance Department of the U.S. Army for any modifications to the facilities at the BOW that were necessary to remove production bottlenecks and maintain prior production capacities. A002091.

321. Any capital improvements of the facilities or equipment at the synthetic rubber Plancors at the Baytown Facility required the approval of the RuR. A002108–A002114; A002123; A002128–A002142.

5. Waste Processing

322. In 1946, RuR acknowledged that at the time the various synthetic rubber Plancors were designed and constructed, the RuR directed that only minimal "industrial wastes treatment and disposal facilities" be installed at these Plancors, stating as follows: "[m]any of these facilities were designed to meet only the minimum requirements because the more comprehensive programs in many instances could not be justified in the war emergency and the scarcity of critical materials." A002143.

323. RuR had to approve the construction of any "special waste disposal facilities" at the synthetic rubber Plancors. A002108–A002114; A002123.

324. Following WWII, the Government began to address the pollution resulting from the operation of the Plancors by first centralizing RuR's authority in air and water pollution matters with respect to these plants, as an RuR official noted in an internal memorandum:

> In view of the increasing importance of active attention to problems concerned with air and water pollution in our operating plants, it is deemed advisable to centralize the contacts and work on such projects under Reserve's direction in a single office. A009812.

325. In 1946, RFC retained an environmental consultant—Sheppard Powell—to conduct audits of the production operations and waste processing facilities at the synthetic

rubber Plancors at the Facilities and for the consultant to provide RFC and RuR with recommendations for waste processing modifications and improvements. A001295–A001304; A001498–A001509; A001399–A001408; A003433–A003439; A001794–A001802.

326. In 1946, RFC arranged for a comprehensive audit report regarding the waste processing facilities and operations at each synthetic rubber Plancor nationwide. The 1946 comprehensive audit report set forth that during WWII the United States declined to authorize necessary improvements to the waste processing facilities at the synthetic rubber Plancors, stating as follows:

> [d]uring this period, it was recognized that some raw and partially processed materials were lost into waste waters leaving the plants, and that some of these substances were causing a stream pollution problem. However, personnel could not be diverted from more pressing objectives to study the complex problems related to waste prevention or treatment - nor could construction materials be secured for such purposes. A002147.

327. In 1946, RuR correspondence to Sheppard Powell, the RuR noted as follows:

> We would like to ask our Agent companies to provide us with the reports [audits of waste processing facilities] concerning their singular installations but we feel in the main the organizations operating plants for us do not have the specialized personnel necessary for such work. A002143.

328. In conducting industrial waste audits of a number of the Plancors at each Site, Government consultant Sheppard Powell recommended a number of waste processing improvements. Examples of such recommendations include: (1) at the Baytown Butadiene Plancor, Mr. Powell made four recommendations, including frequent skimming of the final separator and effluent sampling to test for oil and other hydrocarbons; (2) at the Baytown Butyl Rubber Plancor, Mr. Powell made six recommendations, including draining oil into small sumps to ease the burden on the master separator and implementing a plan to "reduce the pH of the boiler blowdown water;" (3) at the Baton Rouge Butadiene Plancor, Mr. Powell made two recommendations, including identifying a method to break down two oil emulsions and studying how to remove copper from plant effluent; and (4) at the Baton Rouge Butyl Plancor, Mr. Powell made two recommendations, including installing adequate equipment to remove rubber crumbs and polymer from entering into waste waters and designing "gravity separators for efficient removal of small rubber crumbs." A001295–A001304, A001399–1408, A002175–2182, A002183–A002193.

329. During WWII, the Ordnance Department of the U.S. Army knew that some, if not most, of the spent alumina catalyst waste generated at the hydroformer reactor processing unit at the BOW was disposed of in open dumps at or in the vicinity of the BOW. A001159; A001157–A001158; A001160–A001161; A001162–A001164; A001165; A001156; A001166.

330. In the late 1940s, Humble had to obtain the Government's approval to install an effluent treating system for the treatment of the condensate oil emulsion wastewater generated at the Butadiene Plancor at Baytown. A002194–A002203.

331. In April 1947, Standard Oil requested the RuR's permission to replace a temporary separator with a "General Separator" at the outlet of the 72-inch sewer serving the BR Butyl Rubber Plancor and the other plants in the Chemical Products area at Baton Rouge, but the RuR denied the request, A002204–A002207, although several years later RuR granted permission. A002209.

332. In the late 1940s, RuR officials conducted meetings with Texas State environmental officials regarding the issues of water pollution and the effects of the wastewater discharges from the synthetic rubber Plancors at Baytown into nearby surface water bodies and then would inform plant-level employees of the outcome of such meetings. A002210.

333. The requirement to obtain RuR's permission for any significant construction or installation, including waste processing improvements, at the synthetic rubber Plancors continued in the 1950s. For example, in late 1952 Humble, which had been described by RuR as its "agent" in regard to the extension of a steel sewer pipe at the Butyl Rubber Plancor at Baytown, recommended that a 24-inch steel sewer pipe replace a drainage ditch that was conveying wastewaters from the synthetic rubber Plancors to Scott's Bay. RuR wanted a much shorter steel pipe to be installed and to continue to use the drainage ditch to convey the wastewaters to Scott's Bay. However, after Humble informed RuR that the open drainage ditch was adjacent to residential housing, and therefore, the wastewater was passing through residences via an open ditch, RuR approved the length of steel sewer pipe recommended by Humble. A002211–A002224.

6. Other Operational Aspects

334. Pursuant to the operating contracts and as supplemented by RuR's issuance of a "Manual of Administrative Procedures," RuR imposed a myriad of additional operational requirements and procedures upon the operation of each synthetic rubber Plancor at Baytown and Baton Rouge; specifically, this manual required Humble or Standard Oil to comply with, for example, the following requirements: (1) submit daily and monthly production and product quality reports to RuR; (2) obtain RuR approval of most plant-related expenditures; (3) obtain RuR approval for the disposal of waste, scrap, byproducts and surplus materials and equipment; (4) obtain RuR approval, and comply with detailed procedures, regarding any additions to, alterations, or improvements to the plant; and (5) obtain RuR approval of employee salaries and benefits above a relatively low threshold amount. A002985–A003087.

335. The Ordnance Department of the U.S. Army had a permanent staff and detachment stationed at the BOW to command and supervise its operation. A003440; A001133.

336. In the early 1940s, the U.S. Army stationed an infantry company (which was replaced by a U.S. military police unit in 1943) at the BOW to secure and protect the plant. A002061.

337. The BOW contained two Army barracks buildings and a mess hall for the U.S. Army personnel stationed at the plant. A002225–A002227; A002228–A002229; A001073.

338. According to Humble, the U.S. Ordnance Department supervised the operation of the BOW during WWII, stating as follows in a report regarding the BOW:

> [o]perations of the plant were and are under the supervision of the Ordnance Department of the United States Army and representatives of such department were stationed upon the site prior to the commencement of operations, and a complete staff has been maintained on the site since that time. A001162.

339. According to a 1943 Humble memorandum, the Ordnance Department of the U.S. Army managed the operations of the BOW in numerous respects, stating as follows:

> [t]he administrative load in connection with operations has been abnormal because of the Ordnance Department's efforts to administer many affairs which, under the terms of the Contract appear to be the Contractor's prerogative. . . . We are subjected to a steady stream of orders from this office stating how various phases of the business should be conducted and specifying numerous reports to be submitted daily, weekly, and monthly to St. Louis covering personnel, absenteeism, average hourly rates, overtime payments, production quotas, maintenance costs, warehouse inventories on a dollar basis (including catalyst as a spare part), etc. The latest order, for example, states that no equipment of any kind or cost other than regular warehouse items may be acquired by the BOW without prior approval of that office. . . . Hence, we are subjected to inspections by representatives from this office who have had negligible knowledge of refining operations but who recommend numerous changes in our safety, fire fighting, and plant protection procedures and equipment. Likewise, inspectors from the Eighth Service Command regularly check our sanitary facilities and require a monthly report from us as to the adequacy of our water supply and sewage facilities. A002230–A002236.

340. DPC maintained an office and permanent staff at the Baytown Facility. A002237.

341. In a 1944 DPC memorandum, a DPC official stationed at the Baytown Facility stated as follows in a memorandum regarding an employees workplace issue at the Butyl Rubber Plancor:

> [o]n numerous occasions I sit in my office looking out of the window along about a quarter to five and can see the men gathering up through the aisles of the boiler house section and lining up to make a rush for the time clocks at five o'clock. Since this matter has not just occasionally happened, but has been constant for weeks, it is running into a considerable loss of time. . . . Please take steps with the general contractor

> to see that the condition is eliminated or the matter will have to be taken up with Washington, where I am sure we can get results. A002237.

7. Government Designates Humble and Standard Oil As Its "Agent"

342. Humble and Standard Oil were designated as an "agent" of DPC in various operating contracts regarding the construction of the Plancors at both Facilities. *See supra* PF ¶¶ 241, 248, 263, 272, 280.

343. Humble was described as the "agent" of the RuR in "Service Order Contract No. 629-1" in 1953 regarding the installation of a 24-inch cement-lined steel pipe sewer from the south end of the synthetic rubber Plancors' sewer to Scott's Bay at the Baytown Facility. A002238–A002270.

344. Humble was described as the "agent" of the Government in a "Service Order No. 2" to investigate and prepare recommendations concerning the treatment and disposal of wastes from the Butadiene and Butyl Rubber Plancors at the Baytown Facility. A002271–A002278.

345. While naphtha obtained from the processing of crude oil at the Baytown refinery was the source of most of the toluene produced at the BOW, to the extent raw materials from elsewhere were used, the Ordnance Department of the U.S. Army required that Humble serve as its "agent" for the purchase of such materials for use at the BOW, A002279; A002046–A002049, and similarly directed Humble to cease purchases of such materials when they were no longer necessary. A002280; A002281–A002282; A002283–A002285.

346. Humble and Standard Oil were instructed to act as the "agent" of RuR in the shipment of synthetic rubber products from the synthetic rubber Plancors at the Baytown and Baton Rouge Facilities; for example, on numerous shipping orders of products from these Plancors to various other purchasers and destinations, RuR designated them as the "agent" of the Government in arranging the shipment. A002286–A002340.

347. Humble was the designated "agent" of DSC in purchasing some limited amounts of feed stocks for Plancor 1909; for example, a PAW "Memorandum of Recommendation" for Plancor 1909 stated that "insofar as the purchase and acquisition of feed stocks and the disposition of the final product is concerned Humble acts solely as agent for Defense Supplies Corporation . . . ." A002341–A002346.

V. <u>Wastes, Waste Processing Facilities, and Process Improvements and Waste Handling Improvements</u>

A. Crude Oil Processing Rate and Waste Generation

348. Gregory G. Kipp, who is an expert on forensic waste issues, stated that "[t]hroughout the period of operation of these two refineries the amount of waste generated was proportional to the amount of crude oil throughput processed." In fact, Kipp further stated that "during the wartime period this proportion—the amount of waste generated to the amount of crude oil processed—was even greater as a direct result of the Government directives that mandated operating the process/production units virtually continuously, at extreme operating

conditions, e.g., severe cracking processes, and with minimal maintenance and repair." Ex. 2, Att. B, Kipp 2016 Rpt. at Executive Summary. Further, Kipp stated that "production is an appropriate means of assessing waste generated at the two facilities because there is a close relationship between production volume and increased waste generation; although . . . , during the wartime period specifically waste generation was disproportionately high as compared with crude throughput because of the strains that Government demands put on the operational and disposal units." Ex. 2, Att. B, Kipp 2016 Rpt. at 11. In addition, based on his prior forensic analysis conducted in the related *Shell* wartime contract case (*Shell Oil Co. v. United States*, 130 Fed. Cl. 8 (2017)), he further determined that the Government knew of this close relationship between production and waste generation during WWII, stating in his expert report in this Exxon case that "the Government has previously stipulated in another case [the *Shell* case] that in 1941, 'the United States was aware that spent alkylation acid and acid sludge were produced in the manufacture of aviation gasoline and that increasing production of aviation gasoline would increase the amount of spent alkylation [acid] and acid sludge generation.'" Ex. 2, Att. B, Kipp 2016 Rpt. at 29–30.

349. Refinery remediation expert Jere M. Johnson stated that "[t]he amount of waste generated by a refinery is related to its crude oil throughput capacity (i.e., the larger the crude oil throughput capacity, the larger the amount of wastes generated). The United States Environmental Protection Agency has recognized the relationship between waste quantities and crude capacity, although, waste reductions and waste processing improvements must also be taken into account." Ex. 8, Att. B, J. Johnson 2012 Rpt. at 78.

350. Refinery operations expert David B. Lerman identified examples of types of oily wastes whose generation is directly related to the processing of crude oil throughput at these refineries, stating "[s]ome sources of waste are the results of leaking pipes and tanks, which are correlated with inventory turnover that is proportional to refinery throughput; other wastes such as process wastewater from stripper operations at the pipestill and cracking operations are also proportional to the refinery throughput dictated by the government." Ex. 9, Att. B, Lerman 2015 Rpt. at 7.

351. Government expert witness Dr. James R. Kittrell stated that "[i]n my opinion, most experts agree that the waste generation at the Exxon refineries was proportional to the crude processing rate of the refinery, before during and after WWII." Ex. 19, Kittrell 2016 Rpt. at 31. Dr. Kittrell further stated that "[t]here is little or no question that there have been process improvements at oil refineries, that at least some of those improvements reduced one or more species of waste production, and that Exxon would have adopted any number of these over time (Mr. Kipp's reference to cathodic protection being but one example)." Ex. 20, Kittrell 2017 Rebuttal Rpt. at 6.

352. In 1974, the U.S. Environmental Protection Agency ("EPA") determined that there is a direct correlation between a refinery's crude oil throughput capacity and the amount of wastes generated by the refinery's operations. A002735–A002741.

B. Baytown Facility

1. Wastes

353. The Baytown refinery production operations generated approximately 30 million gallons per day of wastewater during WWII, and the wastes generated included once-through cooling water, oily slop, oil emulsion, spent acid sludge and other sludges, boiler blowdown waste, suspended coke, waste catalyst and oily silt. A002352.

354. The distillation units and catalytic cracking units generate the majority of the wastewater load and oil content in the wastewaters generated by the refineries. A technical report regarding the Baton Rouge refinery determined that the operation of the distillation and cracking departments generated 68% of the oil content in the wastewaters generated by the refinery's operations in the late 1960s. This report further provided technical data showing that the distillation units specifically generated 42% of the oil content in the refinery's wastewaters, and the catalytic cracking units generated 26% of the oil content in the refinery's wastewaters. A003449; A003450.[17] In addition, according to an EPA technical report, the operation of the distillation units generates 44% of the wastewater load, and the operation of the fluid catalytic cracking ("FCC") units generates an additional 26% of the wastewater load, at a typical refinery. A003465.

355. The BOW and Plancors production operations generated a considerable amount of numerous types of wastes as well during their periods of operation. *See* PF ¶¶ 234–37, 244–45, 251–52, 259–60, 268.

356. During the wartime period, the wastes and wastewaters generated by the Baytown refinery, BOW, and Plancors production operations were managed and/or disposed of at various waste units located on-site at the Baytown Facility and/or disposed of into off-site adjacent surface water bodies, such as the Houston Ship Channel/Black Duck Bay, Mitchell Bay and/or Scott's Bay. *See* Section VI. A. *infra.*

357. Prior to and during WWII the Government knew that the production of avgas and other war products generated wastes, and the dramatic increases in avgas and other war products production required by the Government mandate and directives resulted in a concomitant dramatic increase in waste generation. A000842. In fact, the United States previously stipulated that "from 1941, the United States was aware that spent alkylation acid and acid sludge were produced in the manufacture of aviation gasoline and that increasing production of aviation gasoline would increase the amount of spent alkylation and acid sludge produced." A003344.

---

[17] Drawing B-4 (A003450) indicated that the distillation and cracking department generated 68% of the oil content in the refinery's wastewater. Table A-1 (i.e., A003449) indicated that the cracking department units (i.e., PCLA, Phenex, HCLA, PHLA-1 and Coker) generated 38% of the oil content generated by the distillation and cracking departments combined. Since these two departments generated 68% of the overall oil content in the refinery's wastewater, then the cracking department units generated 26% of the overall oil content in the refinery's wastewater (i.e., 38% of 68% = 26% of 100%), and the distillation units generated 42% of the overall oil content in the refinery's wastewater (i.e., 68% - 26% = 42%). Exxon notes that one of the cracking department units listed above (i.e., the Phenex) was not a production unit, but rather a unit used to remove phenols from cat cracker distillate water generated by other process units in the cracking department. A010319

358. According to expert Gregory Kipp "the Government recognized the consequences its directives had on waste generation and disposal. Indeed, the PAW recruited 'its executive and technical personnel . . . mainly from oil companies,' A010312 and so staffed the agency with personnel well-qualified to understand the current disposal capacity of the industry--and who also knew that increased production would necessarily create increased waste, and that new wartime production demands would create new and increasingly toxic forms of waste. The PAW had a direct understanding of the impacts on the Baytown and Baton Rouge refineries because the deputy director of the PAW, Ralph Davies was the ranking vice president of Standard Oil before the war. Similarly, the PAW also established the Petroleum Industry War Council (PIWC), comprised of oil executives, to assist PAW 'in the development of policies and in planning and carrying out regional, national, and international programs.' A010312. Finally, the PAW established the Aviation Gasoline Advisory Committee (AGAC), comprised of refinery experts to advise the PAW and refiners on factors related to maximizing avgas production. A000299. Thus, the Government was well-staffed with industry-technical expertise and well understood the consequences of its directives." Ex. 2, Att. B, Kipp 2016 Rpt. at 4.

359. According to expert Kipp, the production of avgas and other war products required by the Government generated "new types of waste with unprecedented toxicity and traditional wastes in unprecedented volume" at the Baytown Facility during WWII. Ex. 2, Att. B, Kipp 2016 Rpt. at 11. The types of traditional wastes that greatly increased in amount included, for example, separator sludge, slop oil and slop oil emulsions, filter clays, heat exchanger bundle cleaning sludge and oily wastewaters. The new types of wastes generated included, for example, slurry oil bottoms, spent catalysts and acid sludge. Ex. 2, Att. B, Kipp 2016 Rpt. at 11, 14–20.

360. The wartime production operations at both Facilities increased the generation of separator sludge. Both Facilities required tremendous amounts of once-through cooling waters to cool the process units and the source of these cooling waters was the silty waters from nearby surface water bodies. Heavy hydrocarbons adhered to the silt in these cooling waters during their use, and the more complex wartime production operations—as compared to the pre-war operations—required greater amounts of silty cooling water and resulted in greater amounts of oil-laden silty cooling wastewaters, whose processing generated more sludge. Ex. 2, Att. B, Kipp 2016 Rpt. at 19–20.

361. The wartime production operations generated greater amounts of heat exchanger bundle cleaning sludge. This type of sludge was generated in the tubes in the heat exchangers, which were used to heat or cool different types of petroleum fractions passing through the exchangers, and the constant transfer of these fractions at varying temperatures generated sludge in the tubes. The wartime production operations generated more of this type of sludge because the new and modified process units required more heat exchangers, and these units were run at much greater operational levels and higher pressures and temperatures, which put more stress on the heat exchangers resulting in greater sludge generation. Ex. 2, Att. B, Kipp 2016 Rpt. at 17–18.

362. The wartime production operations generated more slurry oil bottoms and spent catalysts because "the severe cracking dictated by the Government exacerbated the production

of heavy PAHs [i.e., carcinogenic polyaromatic hydrocarbons], but it also created and exacerbated waste disposal issues--as the Government well knew. Unlike modern refineries, FCC units urgently developed to meet wartime needs did not have effective means of separating the very fine catalysts from the heavy oil that was created by severe cracking. The result was a viscous slurry oil comprised largely of toxic, environmentally persistent PAHs mixed with clay catalyst, for which the only technical recourse in WWII was land disposal. This result was necessarily required by Government production demands." Ex. 2, Att. B, Kipp 2016 Rpt. at 14.

363. According to expert Kipp, the severe cracking operations required by the Government increased oily leakage and related contamination, stating "[s]evere cracking is extremely hard on refining equipment and caused conditions conducive to leaks. FCC units create hydrogen, which promotes hydrogen embrittlement, cracking of equipment metal, and ultimately leaks and failures in process equipment. Likewise, FCC units produce sour gases and wastewater that promote equipment corrosion. High temperatures and pressures used in severe cracking directed by the Government further shortened the viability of process equipment and promoted leaks." Ex. 2, Att. B, Kipp 2016 Rpt. at 15.

364. Expert Kipp further found that the new wartime process units and the focus on maximizing the production of avgas and other war products greatly increased both the amount of wastes generated and the toxicity of the wastes, stating "a major advantage of certain new wartime process units, such as the catalytic crackers, is that they produced greater amounts of BTEX [i.e., benzene, toluene, ethyl benzene and xylene] that were critical to increased production of avgas and other war products. Benzene and xylene were critical high-octane avgas components. Toluene was the backbone of tri-nitrotoluene ordnance production, and ethyl benzene was the essential precursor for styrene production in the Government's styrene rubber plants. The aqueous wastes generated from the processing and production of [FCC] feedstocks into products contained high levels that were thousands of times higher than the typical groundwater standard for benzene (i.e., 5 parts per billion). To claim, as Dr. Kittrell does, that the wartime operations did not increase the amounts and toxicity of the contaminant wastes as compared to the prewar years ignores one of the primary purposes and effects of the wartime production operations. Toxic BTEX waste was ubiquitous because these petroleum products were desperately needed for the war, and the operations that produced them also generated substantial BTEX and toxic carcinogenic polyaromatic hydrocarbons ("PAHs") contamination. These types of wastes and related contamination were necessarily a key focus of Exxon's recent, expensive cleanup actions as, for example, the removal of BTEX constituent contamination was a vital part of the ongoing cleanup of the impacted groundwater." Ex. 2, Att. C, Kipp Supp. 2016 Rpt. at 25.

2. Waste Processing Facilities

365. During the approximate time period of 1941 to the early 1950s, the Baytown refinery contained three wastewater processing systems—the "central disposal system," the "north disposal system" and the "southwest disposal system" A002352–A002353; A002364; A002391—that managed the wastewater effluent generated by the refinery (including both the operating units and the tankage/tank farm areas), the Hydrocodimer Plancor (located within the refinery), and the BOW, and managed certain wastewaters generated by the Butyl Rubber and Butadiene Plancors. A002352–A002353; A002364; A001078; A001296–A001297; A001400.

See also Ex. 6, Att. B, Gravel 2012 Rpt. at 93 (Figure 20 – Humble 1952 depiction of the wastewater processing system in the mid-1940s).

366. The "central disposal system" collected wastewater from "essentially all of the operating units and the greater portion of the tankage in the refinery proper," which included the avgas production unit and the Hydrocodimer Plancor, the BOW, certain waste streams generated by the Butyl Rubber and Butadiene Plancors, and most of the tankfarms and tankage area at the refinery. This system had a west branch and an east branch. The west branch of this system transported the wastewater effluent successively through the following waste units to a specific surface water body: (a) an open ditch, which was called the West Drainage Ditch; (b) the monolithic sewer; (c) Separator 10; (d) an open ditch, which was called the Outfall Canals; and, finally, into (e) the Houston Ship Channel. The east branch of this system transported the wastewater effluent successively through the following waste units to a specific surface water body: (a) Separator 1; (b) the monolithic sewer; (c) Separator 10; (d) the Outfall Canals, and finally into (e) the Houston Ship Channel. The "central disposal system" also processed wastewater effluent from the southern dock area of the refinery by transporting this effluent successively through the following waste units to a specific surface water body: (a) Separator 12; (b) the Outfall Canals; and, finally, into (c) the Houston Ship Channel. A002352; A002364; A002392.

367. The "north disposal system" collected wastewater and drainage from the crude oil tank farms, such as the North Tank Farm, and the area north of the refinery's operating units. This system transported this wastewater effluent successively through the following waste units to a specific surface water body: (a) open ditches (i.e., the Velasco Street Ditch); (b) Separator 9; and, finally, into (c) Goose Creek, which ultimately flowed into the Houston Ship Channel. A002353; A002364.

368. The "southwest disposal system" collected wastewater and drainage from the refinery's tankage and other areas southwest of the refinery, and also received additional wastewaters in the event of an overflow of the baffle in the West Ditch, which would include wastewater from all process units in the west part of the refinery, as well as the wastewater generated by the BOW and the Hydrocodimer Plancor 1909 during the wartime period. This system transported the wastewater effluent successively through the following waste units to a specific surface water body: (a) an open ditch; (b) Separator 2; and finally into (c) Mitchell Bay. A002352; A002364.

369. The three synthetic rubber Plancors—Butadiene, Butyl Rubber and Copolymer—had a separate dedicated wastewater processing system. All three Plancors disposed of most of their wastewater effluent through a common main sewer line that discharged the effluent into Scott's Bay. A001295; A001225; A001399; A001366; A001498; A001495–A001497; A002394–A002395.

370. Some of the wastes generated by the synthetic rubber Plancors were treated and/or disposed of in the Refinery's wastewater processing system and other solid waste units, including the following: (a) Butyl Rubber Plancor—naphtha waste, slop oil and floating rubber polymer, A001401; and (b) Butadiene Plancor—slop oil, quench oil emulsion, steam

condensate (containing tertiary butyl alcohol and caustic acids), and separator sludge. A001296–A001297; A001304.

371. Environmental contamination associated with oil leaks and spills occurring during WWII and for a number of years thereafter at the Baytown Facility (and the Baton Rouge Facility) can be directly connected to Government controls during the war. According to refinery operations and forensic waste issues expert Gregory Kipp, "there is a causal relationship between refinery construction practices during the war necessitated by Government requirements, and the oil leakage that persisted for a few years after the war. During the war and in conjunction with the Government's mandate to maximize avgas production, the Government required the refiners to maximize avgas and other war products production using the least amount of and lowest quality construction materials and the lowest quality equipment workable for the job, and then to operate the process units and related equipment and infrastructure continuously, at or above capacity, and with minimal maintenance and repair. These wartime operating conditions and requirements created ideal circumstances for oil leaks and spills to proliferate, and the wartime requirements also precluded the refiners from devoting manpower, funds and efforts to leak detection, abatement and repair. Once the war ended and Government controls ceased, it was not possible for the refiners to rectify overnight conditions and resulting problems and issues that could not be rectified during the war. Given this, it is logical then that much of the leakage of oil and oily wastes continued for a period of time after WWII and is reasonably related to war construction and operational practices required by the Government that left a legacy of compromised, leaky equipment discharging pollution for a number of years thereafter." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 2–3.

372. Further, the operating conditions required by the Government during WWII also contributed to the contamination and pollution occurring for a number of years after the war. According to expert Kipp, "there was a causal relationship between the installation of wartime processes like catalytic cracking and the deterioration of wastewater quality. The operating conditions required by the Government during the war contributed to the contamination and pollution at these facilities for a number of years after the war, which continuing contaminant contributions were ultimately reduced over a period of years by the post-war process controls and waste reduction improvements, because these wartime operating conditions generated unprecedented types and volumes of wastes that exceeded the treatment capability of traditional wastewater equipment in existence during the war." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 21.

3. Post-WWII Process Improvements and Waste Handling Improvements

373. Prior to 1947, the Baytown refinery's waste processing system was as described in the Humble schematic below (from A002364):

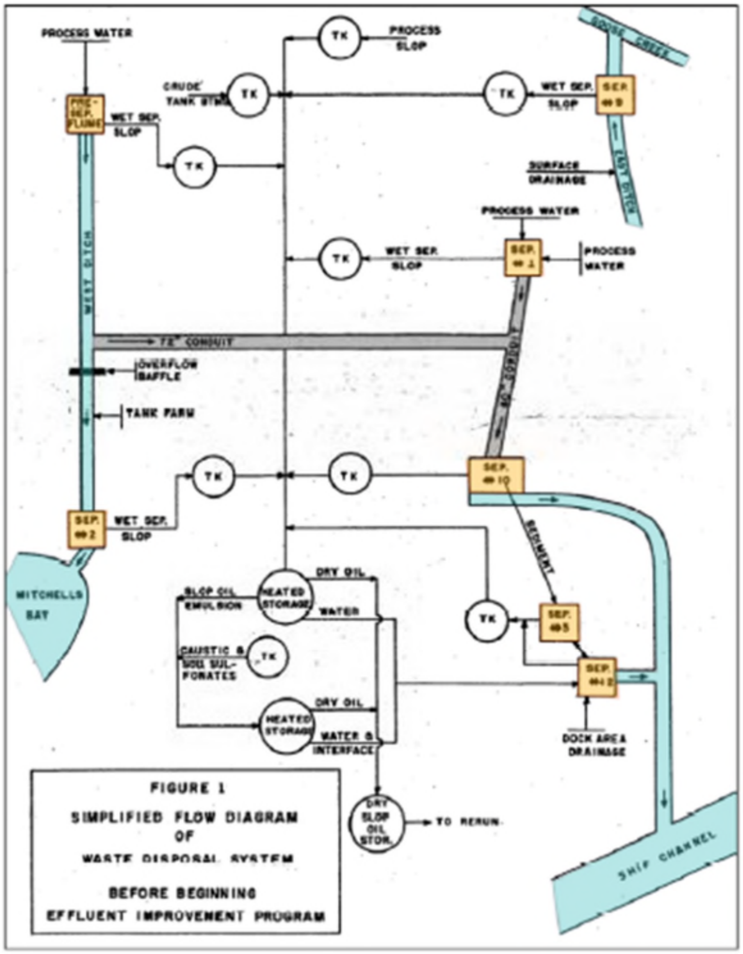


FIGURE 1
SIMPLIFIED FLOW DIAGRAM
OF
WASTE DISPOSAL SYSTEM
BEFORE BEGINNING
EFFLUENT IMPROVEMENT PROGRAM

374. According to expert Gregory Kipp, "[f]undamental ways a refinery can reduce site impairment from waste include elimination of the waste source, reduction in the amount of the waste, recycling the waste or treating the waste using methods that reduce or avoid site environmental impairment" and "[t]he Baytown and Baton Rouge facilities achieved the following types of waste reductions during the post-WWII period:

1. Reductions in oil losses and better management of slop oils (including separator sludge);

2. Reductions in wastewater volume; and

3. Reductions in wastewater contaminants and improvements in treatment efficiency." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 4.

375. In 1947, Humble conducted a comprehensive study of the refinery's waste processing systems at the outset of its ten-year "effluent improvement program." This study determined that the existing waste processing systems for managing wastewater effluents were "badly overloaded" due to both the significant amount of wastewaters generated by refinery operations—approximately 30 million gallons per day—and the undesirable effects of specific

types of wastes in the wastewaters. A002403; A002350. For example, one of the findings of the comprehensive study was that the separators' efficacy in removing oil and sediment from the wastewater effluent was reduced because "serious difficulties are encountered when emulsions and large quantities of finely divided solids enter the separator with the waste water," resulting in the discharge of effluent that was of "unsatisfactory quality." A002350.

376. In 1948, Humble created the "Refinery Loss Committee." The purpose of the Committee was to identify, evaluate and implement specific process control and waste processing improvements to reduce oil losses and improve wastewater effluent quality. A002410. Humble's view was that waste and contamination should be "attack[ed] at the source," explaining that "[w]here feasible, modifications or additions have been made to equipment and processes to eliminate the production or release of contaminants." A002416.

377. In the latter half of the 1940s, Humble launched a leak detection and repair ("LDAR") program at the Baytown Facility. At that time, Humble acknowledged that "[m]inor leaks and losses, occurring daily in thousands of places at every refinery, constitute a serious and constant problem," and so the Refinery Loss Committee implemented the LDAR program facility-wide. Humble devoted countless man hours to have refinery workers conduct numerous types of daily activities whose purpose was to monitor, identify and resolve any leaks throughout the facility. Humble also installed new equipment or retrofitted existing tanks, piping, valves and other equipment with improvements to reduce oil loss. For example, Humble installed mechanical seals on oil valves throughout the facility, and this resulted in a 60,000 barrels-per-year reduction in oil losses from such valves. A002426–A002428.

378. Another component of the LDAR program involved the installation of cathodic protection on tanks and piping at the Baytown Facility in order to eliminate corrosion of the tanks and piping's metal. The installation of cathodic protection on the tanks and piping reduced corrosion leaks and oil leakage; in fact, Humble reported a 93% reduction in corrosion leaks at the Baytown Facility during the period of 1948 to 1951. A002370.

379. According to expert Gregory Kipp, the LDAR program "greatly reduced and virtually eliminated two types of significant contributors to oil losses. They reduced 'minor leaks and losses [of oil], occurring daily in thousands of places' . . . and oil releases from corrosion leaks. Both had previously been a major source of pollution at these facilities, causing historical contamination that was a significant cost driver of the cleanup work conducted at the Baytown Facility." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 9.

380. Expert Kipp further determined that the LDAR program's "effect on overall pollution control and reductions was significant. Preventing and abating oil leaks and spills on a daily basis throughout the facility had an immediate and direct effect on oil loss reductions. Eliminating corrosion leaks to tanks, piping and other equipment and structures at these facilities was equally vital to minimizing environmental impairment because continued corrosion of tanks and piping would have otherwise resulted in substantial leaks, spills, and releases of petroleum hydrocarbons into the subsurface soils and groundwater throughout the facility. Continued corrosion of tanks and piping would have also resulted in the release of additional oil into the cooling water wastes and general wastewater effluent, and thereby into the sewers, separators and other components of the waste processing facilities. If this had

occurred, it would have also contributed significantly to any soil and groundwater contamination where the sewers, separators and other waste processing facilities were located at these facilities. In addition, prior to the LDAR programs, oil leaks and releases from corroded tanks and piping often occurred underground or otherwise at locations, such as inside process units at interfaces with cooling water, where the leakage was not readily observable, and therefore, would have gone unnoticed, unabated and unrepaired." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 8.

381. Through the Refinery Loss Committee's stewardship, the 10-year "effluent improvement program" included a comprehensive study of the waste processing system, and a series of process control and waste processing improvements and modifications—along with the LDAR program, a number of which are described below—to "reduce the quantity of effluent and segregate and treat undesirable wastes at the source." A002397; A002413–A002419; A002420–A002424. *See also* Ex. 6, Att. B, Gravel 2012 Rpt. at 95 (Figure 21 – Humble 1952 depiction of then current wastewater processing system after various post-WWII improvements).

382. In 1949, Humble installed and subsequently expanded a sanitary sewer system and treatment plant. The company had determined that segregation of the sanitary sewer wastewaters from the process wastewaters would improve the efficiency of the separators in the wastewater processing system because the presence of sewage solids in the separators tended to cause formation of oil-coated solid waste that were carried through the separator system with the effluent. A002353–A002354; A002398–A002399; A000824; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 117. Later in 1951, Humble also constructed a spent caustics and collection system. This system collected and concentrated additional caustic waste streams in the process areas for sale to consumers outside the refinery, thereby eliminating their emulsifying effect on the wastewaters entering the sewers and ultimately the separators. A002361; A000825; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 116.

383. In 1950, Humble modernized Separator 10 by installing continuous oil skimming and sediment removal devices in the separator. Previously, Separator 10 had been operating at reduced efficiency due to a continual buildup of wet sediment slurry at the bottom of the separator and the accumulation of excessive amounts of oil emulsions near the surface of the wastewater in the separator. The upgrading of Separator 10 was important because shortly thereafter, Separator 10 became the primary separator in the refinery's wastewater processing system. A002353–A002354; A002398–A002399; A000825; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 115.

384. In 1951, Humble constructed Preseparator 13 on the central sewer system immediately upstream from Separator 10. The purpose of Preseparator 13 was to provide additional oil-water separation processing of the wastewater effluent before such wastewater effluent was further treated in Separator 10. The addition of Preseparator 13 also allowed the company to cease the use of obsolete Separator 1. A001294; A002354.

385. In 1951, Humble commenced operation of a new Effluent Filtration Unit ("EFU") in the refinery. This unit removed, treated and disposed of certain solid wastes from the wastewater effluent that contained high concentrations of undesirable waste materials which

were reducing the effectiveness of the sewer and separator system. A002355; A002401; A000825–A000827. Along with the EFU, in 1951 Exxon also constructed a spent caustics and collection system to collect and concentrate additional caustic waste streams in the process areas thereby eliminating their emulsifying effect on the wastewaters entering the sewers and ultimately the separators. A002360–A002361; A000825.

386. Prior to the early 1950s, Humble had to store and dispose of the oily sludge or oily slop generated by Separator 10 in various earthen sludge pits, particularly Separator 3M, at the Baytown Facility. However, beginning in the early 1950s, much of the sludge was regularly sent to the newly-constructed EFU, which employed heat demulsifcation and filtration, to treat the sludge in order to recycle and reuse most of the oil in the sludge. The EFU recycled the oily sludge or oily slop into dry solids, dry oil, and essentially oil free water. A002355–A002365; Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 10–12.

387. The operation of the newly-constructed EFU had a number of beneficial effects in regard to waste and contaminant reduction. In conjunction with the many other process control and waste processing improvements, the EFU allowed Humble to cease or reduce the use of a number of sludge pits because the sludge pit adjacent to Separator 2 ceased to be used in the late 1940s, old Separator 12 ceased to be used in approximately the mid-1950s, and the amount of oily sludge or oily slop stored in Separator 3M decreased greatly by the mid-1950s. The EFU's heat, vacuum and steam processes would have reduced the content of semi-volatile and volatile organic compounds, such as benzene, ethyl benzene, toluene, and xylenes (commonly referred to as "BTEX"), which are among the typical constituents of concern in soil and groundwater at refinery sites, and therefore, reduced both the volume and toxicity of the waste generated at the Baytown Facility after the EFU commenced operations. A003469–A003587; A002364–A002365; Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 11–12.

388. By 1952, Humble eliminated the once-through, cooling water generated by the refinery operations by installing additional, permanent cooling water towers. The elimination of the once-through water in the effluent resulted in lowering the temperature of the effluent, reducing the suspended solids and oil content, increasing the retention time in the separators, and increasing the dissolved oxygen content. A002353.

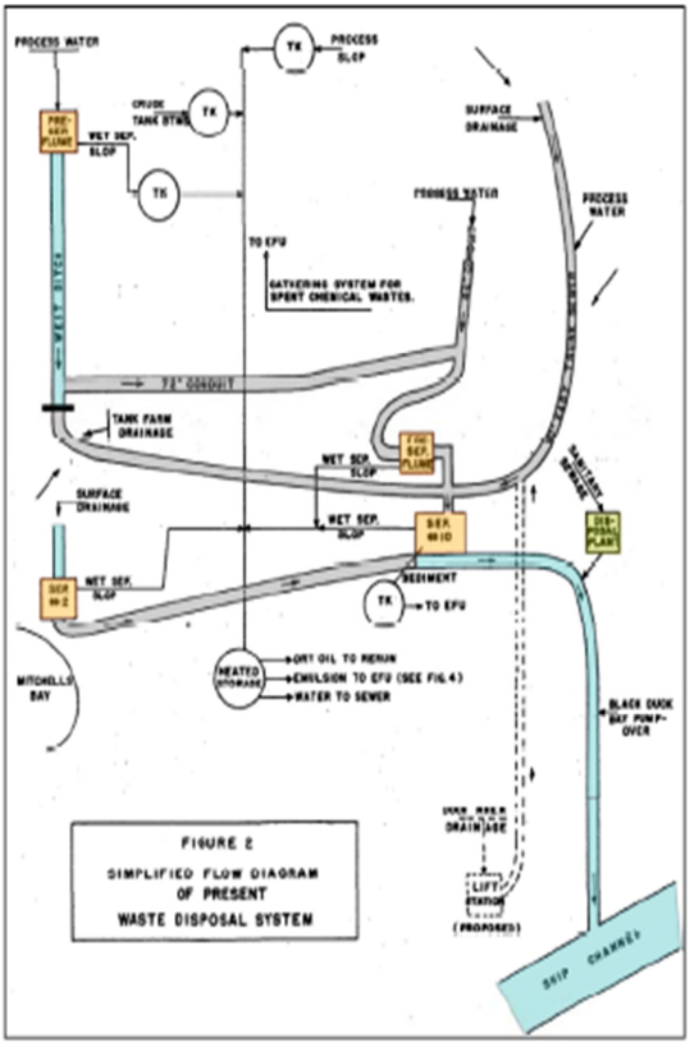
389. According to expert Gregory Kipp, "the post-war reduction of oil wastes, and the elimination of sanitary sewage waste and once-through cooling water from the process wastewaters at Baytown and Baton Rouge, and then the subsequent treatment of the sludge or slop in the EFU, resulted in a substantial reduction in separator soil contamination and contaminant flux to groundwater. The refinery-level process control improvements greatly reduced the amount of oil emulsions, oily silts and other oily solids formation in the wastewater that had reduced the effectiveness of the separators, such as Separator 10, to separate the oil from the solids and the water. The existence of these solid wastes in the wastewater would cause the generation of more separator slop with a much higher oil content collecting at the bottom of the separator, and prior to the operation of the EFU at Baytown, would have also resulted in more separator slop with a high oil content being stored in the sludge pits, such as Separator 3, Separator 12 and the sludge pit adjacent to Separator 2 at Baytown. This much greater generation of separator slop with a higher and more toxic oil content would cause the leaching of more oily waste into the subsurface soils underlying these separators and cause

groundwater contamination." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 12. Kipp further found that the use of landfarming of some sludges in the 1960s also contributed to the proper treatment of residual oil in the sludge and contaminant reduction. Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 12–13.

390. By 1952, Humble modified the "north disposal system" by installing additional sewer lines (i.e., east trunk sewer) on the northern side of the refinery to collect drainage collected from the tankage north of the refinery for transport by these sewer lines to Separator 10 for oil-water separation. These additional sewer lines allowed Humble to shut down old Separator 9 on the northern edge of the refinery and to cease wastewater discharges to Goose Creek, so that such drainage wastewaters could be treated in the modernized Separator 10. A002399; A002354, A002364–A002365.

391. By 1952, Humble modified the "southwest disposal system" by installing sewer lines (i.e., west branch sewer) to divert to Separator 10 all wastewater effluent that had previously been transported to Separator 2. These additional sewer lines allowed Humble to cease to use Separator 2, except for the treatment of surface drainage in the vicinity of Separator 2, and to cease process wastewater discharges to Mitchell Bay. A002353–A002364; A002398–A002399; A000827–A000828.

392. As a result of the implementation of certain components of the effluent improvement program, by 1952 the Baytown refinery's waste processing system had been modified in numerous respects as described above and as shown in the 1952 Humble schematic below (from A002365):



393. In 1952, Humble installed a sour water stripper to strip hydrogen sulfide, phenols and oils from the sour condensate wastewaters generated by the distillation units and the catalytic cracking units, such as the fluid catalytic cracking ("FCC") units, before discharging this wastewater into the main waste processing system. The sour water stripper was expanded in 1957 to similarly treat the sour condensate waste streams generated by the hydrofining and desulfurization units. These sour water waste streams, whose volume was approximately 300,000 to 500,000 gallons per day, contained approximately 3,000 parts per million ("ppm") of sulfide, but the sour water stripper's treatment process reduced the sulfide content in these wastewaters to approximately 50 ppm. A002419; A002511–A002514; A002401.

394. In 1954, Humble installed Preseparator 14 on the west branch sewer immediately upstream of Separator 10. The purpose of Preseparator 14 was to provide additional oil-water separation of the wastewater effluent before such wastewater effluent was further treated in Separator 10. The addition of Preseparator 14 also allowed the company to cease the use of obsolete Separator 4. A002429; A002414–A002419.

395. In 1958, Humble installed Preseparator 15 on the east trunk sewer line immediately upstream of Separator 10. The purpose of Preseparator 15 was to provide additional oil-water separation of the wastewater effluent before such wastewater effluent was further treated in Separator 10. A002430; A002414–A002419.

396. In 1964, Humble constructed a 380-acre reservoir with three stabilization ponds or lagoons to further treat the wastewater effluent before discharge to the Houston Ship Channel. The ponds employed the technique of biological aeration, which involved holding the wastewater in the ponds for a number of weeks so that the aerobic and anaerobic bacteria could decompose residual oils and chemicals in the wastewater and algae in the lagoons could increase the wastewater's biological oxygen content, so as to complete a water purification process of the wastewater effluent before discharge to the Houston Ship Channel. In 1965, ship ballast handling facilities were installed to settle and remove oils for recycling from ballast water before discharging the waters into the sewer system. A002406; A003588–A003590.

397. In 1969, Humble ceased the discharge of wastewater effluent generated by the butyl rubber and butadiene plants into Scott's Bay. A002437; A002453; A002461.

398. By 1951, Humble determined that its initial post-WWII waste processing improvements had already achieved nearly a 60% reduction in overall oil losses at the refinery; in fact, the company determined that oil losses at the refinery were reduced from 1,869 B/D of oil in the latter part of 1948 to an estimated 781 B/D of oil in the latter part of 1951—a 58 percent reduction in oil losses. A002426–A002428; A002463–A002467.

399. By 1957, Humble further determined that it had achieved a 70% reduction in the amount of separator sludge generated at the refinery. Specifically, according to a Humble study in 1947 the Baytown refinery generated approximately 0.067 pounds of separator sludge per barrel of crude oil run, but by 1957 the refinery generated only 0.017 pounds per barrel of crude oil run. This 70% reduction in the amount of separator sludge generated was consistent with Humble data in 1958 showing that in 1947, the Baytown refinery generated 10,000 pounds per day of separator sludge, but by 1957 generated only 4,000 pounds per day of separator sludge, which equated to a 70% reduction when also taking into account the increase in crude oil processing levels in 1957 as compared to 1947. A002483–A002485; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 124; Ex. 8, Att. C, J. Johnson 2012 Rebuttal Rpt. at 53–55.

400. According to expert Gregory Kipp, this 70% reduction in the amount of separator sludge generated "is an important indicator of the overall reductions in pollutant releases at the site because it coincides with simultaneous improvements in the wastewater system that collected sludge and slop more efficiently, ... A 70% reduction in sludge and slop by 1957 that was achieved during a period when Baytown was conducting more efficient sludge and slop collection, logically means that reductions in the overall generation and discharge of pollutants from refinery operations exceeded 70%." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 9.

401. In addition, expert Kipp flatly rejected the purported suggestion that in the post-war period the Baytown Facility was not so much reducing slop and sludge generation, but rather was just generating and disposing of it at different locations, as Kipp specifically found that "[d]uring the post-war period Baytown was generating much less slop or sludge per barrel

of crude oil processed due to new and more improved process controls, such as the LDAR efforts, segregation of sewage, refinery-level chemical treatment, and other process improvements, and separately, Baytown's wastewater processing facilities were much more efficient in collecting these much lesser amounts of slop and sludge that were being generated. In other words, Baytown was generating much less waste, i.e., slop and sludge, and these lesser amounts of generated solid waste, i.e., slop or sludge, were handled, collected and processed much more efficiently than ever before." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 9–10.

402. Based on sampling of the oil content in the refinery wastewater effluent that were taken by Humble between 1948 and 1958, the oil content in the effluent had decreased by at least 95% during this time period. In 1948, the inspections of the wastewater effluent determined that the effluent contained on average 700 parts per million of oil. By 1954, Humble's inspections determined that the oil concentration levels in the effluent had fallen to an average of 51 ppm—a 92% reduction in oil concentrations as compared to 1948 results. Two years later, in 1956, Humble's inspections determined that the oil concentration levels in the effluent had fallen to an average of 29 ppm—a 95% reduction in oil concentrations as compared to the 1948 data. Then in 1958, Humble's inspections determined that the oil concentration levels in the effluent was averaging 32 ppm—a similar 95% reduction in oil concentrations as compared to the 1948 data. In other words, the oil concentrations in the wastewater effluent in 1956 and 1958 were 5% of the oil concentrations in the wastewater effluent in 1948. A002414–A002419; A002483–A002485; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 124; Ex. 8, Att. C, J. Johnson 2012 Rebuttal Rpt. at 52–55.

403. By 1964 at the very latest, Humble determined that it had also achieved a 90% reduction in the oil content in the wastewater prior to its further treatment in Separator 10. According to a 1964 Humble engineering report attached to a Texas Water Commission industrial wastewater permit, the three preseparators upstream of Separator 10 resulted in a 90% reduction in the oil content entering Separator 10. A002492–A002493; Ex. 8, Att. C, J. Johnson 2012 Rebuttal Rpt. at 52–53.

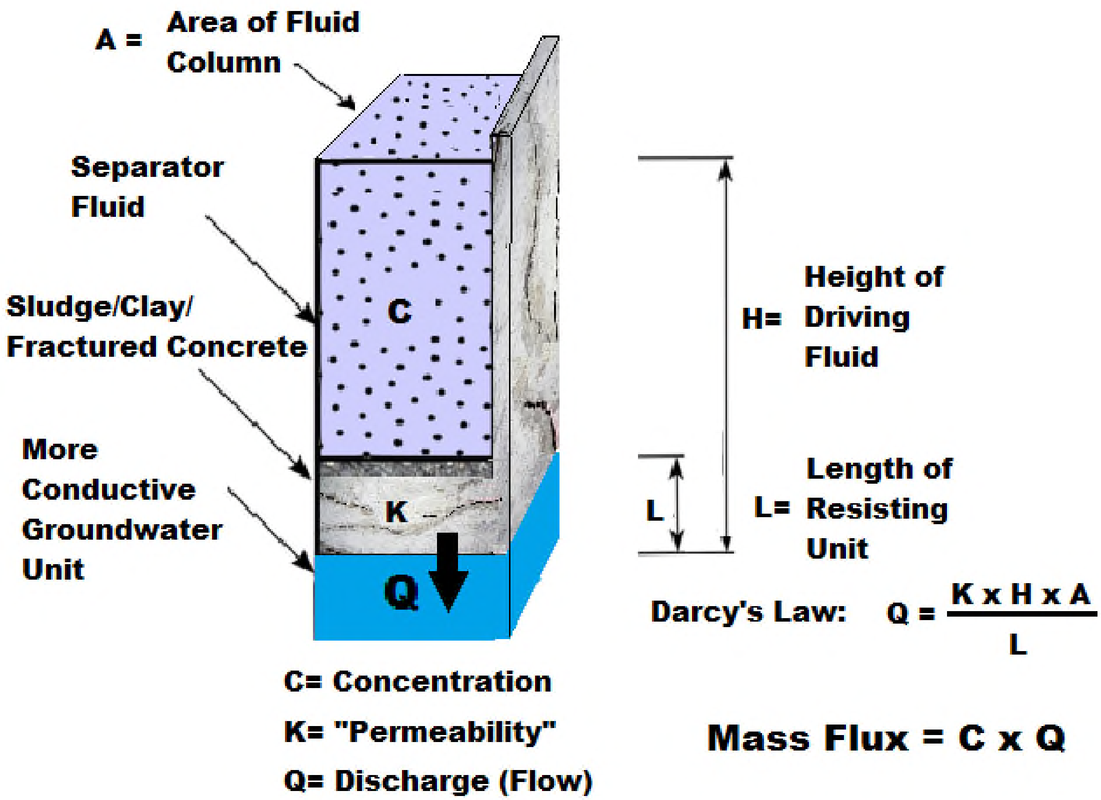
404. Aside from the removal of 90% of the oil content in the wastewaters, expert Gregory Kipp determined that the preseparators served several important, related functions relative to the remaining oily wastes in the wastewaters before entering Separator 10 and these additional functions were:

> "1. The significant removal of light weight, volatile hydrocarbons, such as benzene - priority constituent of concern in groundwater.
>
> 2. The stilling and metering of flows entering the separator system, minimizing turbulence, resulting in increased separator efficiency. This allowed for more crude throughput without increasing the footprint of the separator and associated underlying soil and groundwater contamination.
>
> 3. The removal of easily separable solids, such as grit." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 24.

405. In regard to light hydrocarbon vapors in the wastewaters entering the preseparators, expert Kipp further stated that "the preseparators were also removing the source of those vapors and that was the dissolved hydrocarbons in the wastewater. Accordingly, after treatment in the preseparators, the wastewater discharged to Separator 10 had lower dissolved hydrocarbon concentrations, with a corresponding reduction in contaminant flux to the subsurface." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 24.

406. Expert Kipp further determined that the operation of the three preseparators had a significant effect on soil and groundwater contaminant reduction, and made the following findings: "The reduction of oil concentrations in the water directly reduced the capacity of that water to contaminate underlying soil and groundwater. Since the preseparators removed 90% of the oil content in the wastewater conveyed to Separator 10, beginning no later than 1958 the potential for that aqueous fraction to contaminate underlying soil and groundwater was correspondingly reduced overall by 90%. Moreover, lower hydrocarbon content of infiltrating water typically stimulates natural biodegradation processes of pre-existing releases. Additionally, VOCs were collected from the preseparators, which necessarily come, in part from the water column. Thus, the preseparators served to reduce the mass flux and the toxicity of aqueous hydrocarbon species to soil and groundwater compared to wastewater operations in the 1940s before installation of the preseparators." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 14.

407. Based on the application of Darcy's Law, the reduction in the oil concentration level in the wastewaters entering the separators between the period of approximately 1948 to 1958 would reduce the contaminant flux of oil discharging from the wastewaters through the bottom of the separators by a corresponding amount. Darcy's Law is a mathematical equation that describes the flow of a fluid through a porous medium. Below is a figure containing a graphical depiction of the Darcy's Law's equation and how Darcy's Law applies to determine the amount of oily liquid discharges through the bottom of a separator into the subsurface soils as wastewaters containing a certain oil content enter into and ultimately exit the separator. Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 32. Applying Darcy's Law, the amount of oil discharged through the bottom of the separator is directly related to the oil concentration level in the wastewaters moving through the separator, and therefore, if the oily contaminant concentrations in the wastewater are reduced, the flow or discharge of oily contamination through the bottom of the separator to the subsurface soils and groundwater is proportionally reduced. Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 32–33.



A sectional area (A) of fluid in a separator exerts pressure or driving "head" (H) through a thickness (L) of low permeability (K) materials comprised of sludge, fine sediments, and leaky concrete to produce a flow (hydrologists call it "discharge") that is described by Darcy's Law. The flux of contamination is determined by multiplying the concentration of the contaminant in the fluid (C) by the amount of leaking discharge (Q). Thus, decreasing the area needed for separation or the concentration of effluent in the separator directly decreases the amount of contamination that leaks into the environment.

408. Applying Darcy's Law to compare the wartime performance of the separators to the performance of these separators after the implementation of the post-war effluent improvement program, expert Kipp described the effect on environmental performance of the separators as follows: "the amount of contamination transmitted [into the soils underlying the separators] is directly related to the concentrations of the contaminant in the fluid [i.e., wastewaters passing through the separator]. So when the oily contaminant concentrations in the effluent are reduced, the flow of oily contamination to soil and groundwater is proportionally reduced. . . . For example, when Baytown reduced the oil concentrations in the effluent by 95% between 1948 and 1958, the flux of oil through the separators and earthen channel [i.e., Outfall Canals] would be reduced by a corresponding amount, because the 'mass flux' is mathematically dependent upon concentration. Likewise, when the preseparators eliminated 90% of the oil content entering the separators, they had a corresponding benefit by reducing the contaminant flux beneath the separators." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 33.

409. By 1966, Humble determined that it had achieved a 98.5% reduction in the contaminant levels in the wastewater discharged from the refinery into the Houston Ship Channel when compared to 1948 contaminant levels in such wastewater. Specifically, Humble

determined that the effluent improvement program and subsequent waste processing improvements dramatically improved the quality of the wastewater effluent discharged from the Baytown refinery, specifically stating that "[a]nalyses of volumes of each component contaminant found in effluent at the end of the program were compared with corresponding values for the beginning of the program and showed a 98.5% improvement," A000795; in fact, the study concluded that "the effluent quality at this point was generally of better quality than that of its receiving body, the Houston Ship Channel," A002510–A002514; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 124; Ex. 8, Att. C, J. Johnson 2012 Rebuttal Rpt. at 52–55.

410. In 1966, Humble further estimated that the operation of the lagoons or stabilization ponds should result in an additional 70% reduction in any residual contaminants remaining in the wastewater effluent (after the 98.5% reduction in residual contaminant levels noted above) before the effluent was discharged to the Houston Ship Channel. A000795.

411. According to expert Gregory Kipp, "[r]eductions in wastewater contaminants would have a direct impact on contaminant contributions to soil and groundwater contamination where the wastewater processing facilities were located, as well as the surface water bodies where the wastewater effluent was discharged. It also should be viewed as indicative of how the plant as a whole addresses its environmental performance. . . . Both facilities implemented improved wastewater treatment technologies after WWII that directly impacted residual contaminant levels at the sites, and had the following effects and benefits:

> 1. Reductions in oil concentrations in the wastewater effluent had a direct impact on reductions in pollution site-wide, with correspondingly positive impacts on contaminant flux to soil and groundwater; and
>
> 2. Separation of waste streams, recycling cooling waters, and treating or reducing emulsions rather than directing them to separators reduced the relative size of separator capacity required per barrel of crude (i.e., smaller separator area or footprint per barrel of crude throughput means less contamination released to the site per barrel of crude throughput)." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 20.

412. In addition, expert Kipp explained that "[r]eductions in wastewater contaminants is also generally indicative of and relates to improvement in a facility's process controls and treatment systems and a corresponding reduction in contributions to soil and groundwater contamination throughout the facility. This is because wastewater effluent quality is not only affected by the adequacy of the wastewater treatment facilities, but also the adequacy of the process controls in the production and tank storage areas and the adequacy of the solid waste processing facilities, and so substantial reductions in wastewater contaminants over a period of time would be related to significant improvements in the process controls and solid waste processing facilities." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 21.

413. Expert Kipp further described the direct relationship between effluent performance and site pollution, stating that "[t]he causal relationship between effluent

performance and site pollution stems in large part from the direct function of the sewers as the collection and transport routes for wastes from numerous processes in the refineries. Process wastes directed toward the sewers, whether under normal operating conditions or during a process upset (malfunction), affected the wastewater quality. For example, leaks between hydrocarbons and cooling water in faulty heat exchangers were routed with the cooling water to the sewers and were reflected in effluent quality. Conversely, cooling water that passed through a heat exchanger in good repair exited the heat exchanger without picking up hydrocarbons and resulted in cleaner effluent. Accordingly, effluent quality is an indicator of historical site-wide equipment integrity and pollution performance." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 20.

414. The amount of wastewater effluent generated by the refinery decreased to 17 million gallons per day by 1958, A002415, and to 13.5 million gallons per day by 1970, A002449.

415. According to expert Kipp, between 1947 and 1958, the Baytown Facility had actually achieved a 97% reduction in the total amount of oil in the wastewaters. The 1958 Humble data showing a 95% reduction in <u>oil concentrations</u> in the wastewater did not take into account the separate 1958 Humble data showing that the total wastewater volume had decreased by approximately 43% (i.e., from 30 million gallons per day in the 1940s to 17 million gallons per day by 1958). In other words, there was not only less oil in the wastewater itself; there was also a much lower volume of wastewater. Therefore, in 1958, if the oil concentrations in the wastewater were only 5% of the oil concentrations in the wastewater in 1948 (i.e., 95% less), and the total amount of wastewater decreased by approximately 43%, then the total amount of oil in the wastewater in 1958 as compared to 1948 was approximately 3%, or a 97% reduction in the total amount of oil in the wastewater. A002415; Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 23.

416. Similarly, according to expert Kipp, between 1947 and 1966, the Baytown Facility had actually achieved a more than 99% reduction in the total amount of oil in the wastewaters. The 1966 Humble data showing a 98.5% reduction in oil contaminant levels in the wastewater did not take into account the earlier 1958 Humble data showing that total wastewater volume had decreased by approximately 43%. Therefore, in 1966, if the oil concentrations in the wastewater were only 2.5% of the oil concentrations in the wastewater in 1948 (i.e., 98.5% less), and the total amount of wastewater decreased by approximately 43%, then the total amount of oil in the wastewater in 1966 as compared to 1948 had decreased by more than 99%. A002415; A002510–A002514; Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 23–24.

417. Beginning in the late 1970s and pursuant to statutory mandates under the Resource Conservation and Recovery Act of 1976 ("RCRA") 42 U.S.C. §§ 6901 *et. seq.*, EPA promulgated a series of technical regulations regarding the management, storage, treatment and disposal of solid and hazardous wastes that applied to numerous industrial facilities, including the Baytown Facility, in order to minimize the release of any hazardous wastes to soil, groundwater or surface waters at such facilities. *See* 42 U.S.C. §§ 6901 *et. seq.*

418. Subsequently and pursuant to its RCRA authorization, the State of Texas enacted the Texas Solid Waste Disposal Act, Tex. Health & Safety Code §§ 361.001 *et. seq.*, to provide for a RCRA state statutory and regulatory analog that set forth the same or more stringent

technical regulations applicable to industrial facilities, including the Baytown Facility, located in the State of Texas. *See* Texas Health & Safety Code §§ 361.001 *et. seq.*

419. In order to comply with these numerous federal and state RCRA technical requirements, beginning in the late 1970s, Exxon undertook a number of facility-wide hazardous waste management initiatives; for example, by the early to mid-1980s, Exxon began to conduct cleanup/closures of various waste units, such as, for example, Separators 3M and 10, and then subsequently began to conduct "delay of closure" cleanups for other waste units, such as, for example, the Lower and Upper Outfall Canals and the Velasco Street Ditch, among other investigatory and cleanup activities at the Baytown Facility that are fully described in Section VII *infra*.

420. Expert Gregory Kipp reviewed the Baytown Facility historical data—detailed above—that allocation expert Richard White relied upon to develop certain process efficiency factors employed in his proposed cost allocation for the Baytown site, and related historical records and technical materials. Expert Kipp opined that "these process efficiency factors were valid, reasonable and appropriate in magnitude and timing, and accurately account for reductions in the waste or contaminant contributions from the facility operations during the post-war period, as compared to the wartime period, that impact actual environmental conditions at the Baytown [Facility]. These factors are supported by historical quantitative data establishing significant oil loss reductions, sludge or slop reductions and treatment, wastewater volume reductions and wastewater effluent contaminant reductions and processing improvements undertaken at the Baytown [Facility]. In fact, in my opinion, Mr. White's process efficiency factors are actually conservative because they do not fully reflect significant advances in pollution control and reduction that occurred during time periods when quantitative data is not available, and do not fully reflect the synergistic effect of the pollution control and reduction measures taken as a whole." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 3.

421. Expert Kipp opined that allocation expert "White's reliance on the 70% separator sludge reduction data in support of a 70% process efficiency factor was reasonable and valid, and at least beginning in 1957 must also be viewed as conservative. . . because the 70% figure did not reflect additional slop reduction resulting from Baytown's treatment of stable emulsions, such as the treatment of slop resulting from the cleaning of tank bottoms. Moreover, the 70% process efficiency factor does not even reflect the operation of the EFU, which . . . recycled and reclaimed for reuse most of the oil in the much-reduced amounts of sludge or slop, resulting in a dry sediment that contained relatively low residual amounts of oil." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 14.

422. Expert Kipp further opined that allocation expert "White's reliance on the 90% preseparator oil content reduction data in support of a phased-in 90% process efficiency factor, and his combined application of the 90% and 70% factors after 1958 for a cumulative 97% process efficiency adjustment, was also reasonable and valid. . . . My analysis shows that the reduction in site pollution from the separators after treatment was likely greater than 90% because:

1. The preseparators removed 90% of the oil content in the wastewater -- a driving flux for groundwater contamination.

2. Any slop generated by Separator 10 was removed and recycled by the operation of the EFU. In fact, the combination of the 70% reduction in slop generation, the removal of 90% of any residual oil in the dry sediments through landfarming likely resulted in a greater than 97% overall reduction in site pollution, because, by then, the major sources of site pollution were eliminated, recycled, or treated, and

3. The reduced hydrocarbon content and toxicity of the water flux from the wastewater facilities would have promoted more rapid natural biodegradation of pre-existing releases." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 14–15.

423. Expert Kipp found additional historical and technical support for expert White's 90% waste improvement factor, stating "as expert Mr. Jere Johnson similarly concluded, there were numerous waste reduction and processing improvements undertaken between the late 1940s and the mid-1950s and many had refinery-wide applicability, as well as the start-up of new refinery processes during this period at the Baytown facility. This significant series of actions taken by Baytown resulted in a more than 95% improvement in the effluent quality as compared to the effluent quality shortly after WWII, and even greater improvement in effluent quality by the early 1960s, and this is well-documented, providing additional support for the validity of the 90% process efficiency factor." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 25.

424. Expert Kipp further opined that there is "justifiable scientific logic" for allocation expert White's application of the 70% process efficiency factor in 1957 related to sludge reduction, combined with a 90% waste improvement factor in 1959 related to reductions in the oil content of the wastewaters by operation of the preseparators. Expert Kipp explained that "[t]he preseparators acted to increase pollution mitigation, and supplemented my review and analysis of the significant impact that the process controls and other waste processing improvements (aside from the preseparators) achieved in oil loss and separator slop reduction and oil reduction in the wastewater effluent. The preseparators contributed to the removal of light hydrocarbon fractions, which are the most mobile petroleum constituents in groundwater, and dissolved hydrocarbons in the wastewater effluent and so had a significant effect in reducing oil contamination levels in the wastewater effluent, and the oil content of the separator slop. . . . Accordingly, Mr. White's application of 70% and 90% process efficiency factors, which collectively resulted in a cumulative 97% process efficiency improvement by 1959, is appropriate and likely conservative, and has been confirmed by this further analysis. These factors would relate technically to an overall improvement, site-wide, in pollution conditions, i.e., a reduction in deposition of pollution into the ground and surface waters and a corresponding reduction in site-wide contamination." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 24–26.

425. Expert Kipp further determined that the holistic, facility-wide nature of the post-war effluent improvement program at the Baytown Facility (as well as the Baton Rouge Facility) also supports the use of the historical data of wastewater effluent improvement as a site-wide surrogate for a facility's overall environmental performance, stating "[i]t is this holistic refinery program that makes tracking effluent quality an attractive surrogate for

understanding the environmental health of the facilities, because it is indicative of numerous refinery pollution mitigation activities affecting multiple waste streams from multiple units throughout the refineries. . . . Moreover, because the holistic pollution reduction efforts throughout the facilities following the war lead to the reduction in effluent concentrations, they serve as a reasonable surrogate for refinery-wide reduction in pollution impairment." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 31–33.

426. In regard to the post-war historical data confirming the 95% to 98.5% reductions in the concentrations of oil and other contaminants in the wastewaters, and the 98% to greater than 99% reduction in the total amount of oil and other contaminants in the wastewater, expert Kipp opined that "the percentage reductions in wastewater contaminants during the post-war period would causally relate to, and therefore serve as an acceptable surrogate for determining, the percentage reductions in the contaminant contributions to various waste units, and the soils and groundwater contamination throughout the facility during the post-war period. I also believe that it was valid and reasonable for Mr. White to use the historical data concerning reductions in wastewater contaminants during the post-war period as part of his basis for the process efficiency and waste improvement factors that he developed and applied on a facility-wide basis in his allocation, and these process efficiency and waste improvement factors were conservative in light of this historical data." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 22.

C. Baton Rouge Facility

1. Wastes

427. The wastes generated by the Baton Rouge refinery production operations during WWII included once-through cooling water, oil-laden silt, oily slop, oil emulsion, tank bottoms, spent caustics, spent acid sludge, and other sludges. A002521–A002532.

428. The Plancors production operations generated a considerable amount of numerous types of wastes as well during their periods of operation. *See* PF ¶¶ 275–77, 283–87.

429. During the wartime period, the wastes and wastewaters generated by the Baton Rouge refinery and Plancors production operations were managed and/or disposed of at various waste units located on-site at the Baton Rouge Facility and/or disposed of into off-site adjacent surface water bodies, such as the Mississippi River and Monte Sano Bayou. *See* Section VI. B. *infra*.

430. According to forensic waste issues expert Gregory Kipp, the production of avgas and other war products required by the Government generated "new types of waste with unprecedented toxicity and traditional wastes in unprecedented volume" at the Baton Rouge Facility during WWII. Ex. 2, Att. B, Kipp 2016 Rpt. at 11. The types of traditional wastes that greatly increased in amount included, for example, separator sludge, slop oil and slop oil emulsions, filter clays, heat exchanger bundle cleaning sludge and oily wastewaters. The new types of wastes generated included, for example, slurry oil bottoms, spent catalysts and acid sludge. Ex. 2, Att. B, Kipp 2016 Rpt. at 11, 14–20.

2. Waste Processing Facilities

431. During the 1940s and 1950s, the main components of the Baton Rouge refinery waste processing facilities were located beneath the bluff line in the "batture" area of the Facility. A 1943 refinery plan depicting the layout of Baton Rouge shows the location of this system in relation to the bluff line boundary. A002568; *see also* Figure 2, Baton Rouge Map.

432. During the wartime period, most of the stormwaters, sanitary wastes and liquid process wastes generated at the Baton Rouge refinery were collected in local and regional catch basins and impoundments and conveyed by regional sewer systems to ten main refinery sewers which generally ran east to west and conveyed the wastes to oil/water separators at the western edge of the refinery, in and along the batture area and to Callaghan's Bayou. A002568; A002569.

433. The refinery's sewer system that conveyed the wastewaters to the separators was described as follows shortly before WWII:

> Seven large mains fed by smaller laterals and feeder lines which connect them with various units, buildings, and tanks in their areas. The growth of the Refinery and the resulting addition of new sewers to serve the new units [has] made it necessary to inter-connect and re-route existing sewers. These changes have resulted in a complex sewer system of immense proportions. A002572–A002573.

434. At that time, the refinery primary separators consisted of the Knox Field Separator, Old and New Main Separator, and Storm Separators. All compartments of these four separators were equipped with skimmers for collecting some of the oil in the wastewaters and transferring the oil to slop tanks prior to being reprocessed in the refinery. A002572–A002573; A002536.

435. There was also a large natural impoundment known as the Impounding Basin located in the southwest portion of the refinery. Flows from the impounding basin were directed through a large, lengthy sewer line to a ditch that transported flows through the southern portion of the batture area. A002572–A002573; A002569.

436. During the wartime period, the refinery utilized Mississippi River water for cooling purposes on a once through basis in its processing units. This water contained large amounts of silt which settled out in the oil/water separators, trapping oil in the separator sludge. This oily silt or sludge was periodically washed out of the separators and into Callaghan's Bayou which travels through the batture area to an outfall on the Mississippi River. A002577.

437. The silt treating unit was installed and operating by October 7, 1945. A002584

438. The silt treating unit "removed the necessity of washing the silt from the separators into the Canal." A002587; A002639.

439. The silt recovered from the silt treating unit was deposited in a 20-acre silt pond—known as the Old Silt Pond—located on the batture near the silt treating unit. A002641.

3. Post-WWII Process Improvements and Waste Handling Improvements

440. Shortly after WWII ended, Standard Oil embarked on a nearly decade-long effluent improvement program coordinated by its new Oil Conservation Department ("OCD") and involved a comprehensive study of the waste processing systems, and numerous process control and waste processing improvements. A002610.

441. As part of this program the key waste processing improvement was the construction of a large, state-of-the-art Master Separator in 1952. A002652–A002653. According to refinery operations expert Jere M. Johnson, the operation of the Master Separator, coupled with the operation of the silt treating unit and the disposal of the treated silt into the Old Silt Pond, "essentially eliminated the discharge of oily silt to the Mississippi River" because prior to the operation of these waste units "approximately 240,000 cubic yards per year of oily silt was discharged" and after all of these waste units commenced operations, "this discharge of oily silt was reduced to near zero." Ex. 8, Att. B, J. Johnson 2012 Rpt. at 129.

442. According to expert Gregory Kipp, once the war ended and Government controls ceased, "delays were necessary before installation of the Master Separator to allow for the systematic introduction of appropriate control processes in a timely manner, and thus the time delay inherent in the implementation of the Master Separator can be seen to be due to the wartime demands. This technical situation justifies attributing pollution generated after WWII to the wartime demands of the Government; it would have been technically impossible to implement the requisite process improvements in an efficient manner after WWII concluded without the conduct of the systematic program devised by the refinery personnel. Before the new Master Separator could be effective, site operations needed to be changed to:

1. Segregate emulsion-causing constituents and remove them from the sewer.

2. Provide emulsion treatment to minimize discharge of hydrocarbons to the sewer that were difficult to separate.

3. Reduce the flux of oil to the separators through reductions in oil losses (e.g., the LDAR program). These efforts were the focus of the 1950 OCD report." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 31.

443. As part of the effluent improvement program, Standard Oil also conducted a number of other post-WWII process control and waste processing improvements during the late 1940s and early 1950s, and some of the more significant ones included the construction of the following: (a) additional thermal and chemical demulsification units to treat oil emulsions and prevent their discharge into the separator system; (b) a spent caustic collection system to reduce the amount of caustic discharged into the separator system; (c) a tank bottoms collecting system to reduce the discharge of emulsions from the tank bottoms entering the separator system; and (d) a slop oil collection system at the asphalt loading rack to prevent thick asphalt from entering the separator system; (e) rebuilt the Impounding Basin Separator; (f) upgraded many of the API and storm separators. A002521, A002525–A002529, A002530. According to expert Gregory

Kipp, "[a]ll of these process control improvements reduced the introduction of chemicals, sewage, and other types of suspended solids into the wastewaters that promote slop or sludge generation when such wastewaters are conveyed to and then processed in the oil-water separators." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 16.

444. In the early 1950s, Standard Oil constructed and began to operate an emulsion treating unit ("ETU") that employed treatment technologies comparable to Baytown's EFU. The ETU treated the sludge or slop generated by the separators and oil emulsions in order to segregate, recycle and reuse most of the oil content in the slop. The operation of the ETU involved retention of the slop for several days during which the slop was subjected to heat treatment and the use of demulsifying agents, and a piping network allowed rerun of unseparated emulsions so that only clear effluent resulted from the treatment process. A002562–A002566. In 1950, Standard Oil reported that ". . . all separator slop, crude and fuel tank bottoms from tank cleaning and the heavy emulsion from large earthen tanks [that] contain separator cleanings have been treated without discarding or burning any emulsion or interface formed in treating." A002562–A002566.

445. These waste processing improvements increased the efficiency of the separators system and reduced separator slop generation; in fact, in 1949, OCD determined that 34 percent less separator slop oil was generated than in 1946 on a per barrel of crude oil basis, and in 1950 OCD projected that refinery operations would generate about 61 percent less separator slop oil in 1951 as compared to 1946. A002534; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 129; Ex. 8, Att. C, J. Johnson 2012 Rebuttal Rpt. at 55–56.

446. In the late 1940s, Standard Oil instituted an LDAR program at the Baton Rouge Facility in which the OCD coordinated regular, facility-wide activities to monitor and eradicate oil leaks. The LDAR program had numerous other components whose purpose was to reduce oil leaks and spills, and to promptly abate and cleanup any oil leaks and spills that did occur. Some examples of aspects of the program include the following: (a) the OCD installed gauging hatches in all sewer manholes and then coordinated daily gauge inspections to identify any oil in the sewers at those locations; (b) the OCD introduced an oil tank wagon that traversed the facility on a daily basis to identify and abate oil leaks and spills, repair line breaks and remove tank bottoms; and (c) the OCD began to install cathodic protection on the tanks and piping to reduce corrosion-related oil leaks. A003601; A003602–A003604; A002529; A002548; A003606–A003609; A003610–A003613. According to expert Gregory Kipp, "[l]ike Baytown, a key factor in separator slop reductions was the LDAR program that reduced oil discharged to sewers" at the Baton Rouge Facility. Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 15.

447. During the period of 1947 to 1949, Standard Oil reduced overall oil losses at the Baton Rouge Facility by 58% based on Standard Oil's determination that the overall refinery crude storage and manufacturing loss had been reduced from 2.12% in 1947 to 1.24% in 1949. A002537.

448. During the late 1950s and 1960s, Standard Oil implemented additional process control and waste processing improvements to further reduce oil content in the refinery's wastewater effluent, and these improvements included, for example, the following: (a) removal of much of the silt from the once through cooling waters before their use to cool the refinery

process units to reduce the oily silt in the cooling waters discharged to the separators system; (b) construction of a phenol retention lagoon to provide biological treatment of the wastewater before discharge; and (c) enlargement of the Master Separator to increase its capacity and efficiency at processing the refinery wastewaters. A002675–A002676.

449. These additional process control and waste processing improvements significantly reduced the oil content of the wastewater effluent discharged from the refinery; in fact, according to Standard Oil wastewater discharge data, these improvements reduced the amount of oil by 75 percent and the amount of phenol by 85 percent in the wastewater effluent discharged from the refinery between the late 1950s and late 1960s. A002675–A002676; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 130; Ex. 8, Att. C, J. Johnson 2012 Rebuttal Rpt. at 56.

450. During the late 1960s, Standard Oil implemented the "River Water Replacement Project" that involved the construction of ten, large cooling water towers. These towers allowed the recirculation of cooling waters in the refinery, and eliminated the use and discharge of once-through cooling water. According to Standard Oil wastewater discharge data in the early 1970s, this and other improvements resulted in an additional, approximate 70% reduction in oil and phenol in the wastewater, as compared to the oil and phenol content in the wastewaters in the late 1960s. A002676–A002677.

451. According to expert Gregory Kipp, "[o]verall during the period of 1959 to 1971 period, Baton Rouge reduced oil concentrations in the wastewater effluent by approximately 94%, or to put it another way, in 1971 oil concentrations in the wastewater effluent were 6% of the oil concentrations in the wastewater effluent in 1959." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 26.

452. The amount of wastewater effluent generated by the Baton Rouge refinery decreased from 200 million gallons per day to 20 million gallons per day in the late 1960s. A002627–A002677.

453. According to expert Kipp, between 1959 and 1971, the Baton Rouge Facility had actually achieved a 99% reduction in the total amount of oil in the wastewaters. The 1971 Baton Rouge data showing a 94% reduction in <u>oil concentrations</u> in the wastewater did not take into account the separate late 1960s Baton Rouge data showing that the total wastewater volume had decreased by approximately 90%. In other words, there was not only less oil in the wastewater itself; there was also a much lower volume of wastewater. Therefore, in 1971 if the oil concentrations in the wastewater were only 6% of the oil concentrations in the wastewater in 1948 (i.e., 94% less), and the total amount of wastewater decreased by approximately 90%, then the total amount of oil in the wastewater in 1971 as compared to the 1940s was approximately 1%, or a 99% reduction in the total amount of oil in the wastewater. Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 26.

454. Beginning in the late 1970s and pursuant to statutory mandates under the Resource Conservation and Recovery Act of 1976 ("RCRA") 42 U.S.C. §§ 6901 *et. seq.*, EPA promulgated a series of technical regulations regarding the management, storage, treatment and disposal of solid and hazardous wastes that applied to numerous industrial facilities, including

the Baton Rouge Facility, in order to minimize the release of any hazardous wastes to soil, groundwater or surface waters at such facilities. *See* 42 U.S.C. §§ 6901 *et. seq.*

455. Subsequently and pursuant to its RCRA authorization, the State of Louisiana enacted the Louisiana Solid Waste Management and Resource Recovery Law, LRS 30:2151 *et. seq.*, and related laws and technical regulations to provide for a RCRA state statutory and regulatory analog that set forth the same or more stringent technical requirements applicable to industrial facilities, including the Baton Rouge Facility, located in the State of Louisiana. *See* Louisiana Solid Waste Management and Resource Recovery Law, LRS 30:2151 *et. seq.*

456. In order to comply with these numerous federal and state RCRA technical requirements, beginning in the late 1970s, Exxon undertook a number of facility-wide hazardous waste management initiatives; for example, in the 1980s Exxon began to conduct cleanup/closures of various waste units, such as the Old Silt Pond and Rice Paddy Landfarm, and interim groundwater corrective action, such as in the Shallow Fill Zone, among other investigatory and cleanup activities that are fully described in Section VII *infra*.

457. Expert Gregory Kipp reviewed the Baton Rouge Facility historical data—detailed above—that allocation expert Richard White relied upon to develop certain process efficiency factors employed in his proposed cost allocation for the Baton Rouge site, and related historical records and technical materials. Expert Kipp opined that "these process efficiency factors were valid, reasonable and appropriate in magnitude and timing, and accurately account for reductions in the waste or contaminant contributions from the facility operations during the post-war period, as compared to the wartime period, that impact actual environmental conditions at the . . . Baton Rouge [Facility]. These factors are supported by historical quantitative data establishing significant oil loss reductions, sludge or slop reductions and treatment, wastewater volume reductions and wastewater effluent contaminant reductions and processing improvements undertaken at the . . . Baton Rouge [Facility]. In fact, in my opinion, Mr. White's process efficiency factors are actually conservative because they do not fully reflect significant advances in pollution control and reduction that occurred during time periods when quantitative data is not available, and do not fully reflect the synergistic effect of the pollution control and reduction measures taken as a whole." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 3.

458. Expert Kipp reviewed the process efficiency factors employed by allocation expert White for the Baton Rouge site, summarizing them as follows: "Mr. White applied a process efficiency factor of 34% beginning in 1949, and then increased this process efficiency factor to 61% in 1951 based on historical data regarding separator slop reductions. Then, due to the unavailability of data between 1951 and 1959, Mr. White subsequently applied data regarding oil content reductions in the wastewater effluent between 1959 and 1969, and again between 1969 and 1971, as an additional process efficiency factor." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 28.

459. According to expert Kipp, expert White's use of the historical separator slop reduction data as the basis for one of his process efficiency factors was valid, reasonable and appropriate, and in fact was conservative, and further stated the following: "Mr. White's use of the data from the 1950 OCD report regarding a projected 61% reduction in separator slop was

valid and reasonable because I have reviewed the OCD report and the data and it is sound." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 3, 18. Expert Kipp further stated that "[i]t is likely that Baton Rouge achieved greater slop reductions between 1951 and 1959, but this data is not available, and therefore, Mr. White's process efficiency factor based on slop reduction is conservative because it does not increase during the 1951 to 1959 period." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 29.

460. Expert Kipp further opined that White's use of the historical data regarding oil content reductions in the wastewater effluent was valid, reasonable, and appropriate, and in fact conservative given that White did not also take into account the reductions in wastewater volume and did not take into account the likelihood of oil content reductions in the wastewater during the earlier post-war period due to the lack of available data. Expert Kipp further stated that "[i]t is likely that Baton Rouge achieved reductions in the oil content in the wastewater prior to 1959 during the period of 1951 to 1959 but this data is not available, and therefore, Mr. White's process efficiency factor for oil content reductions is conservative because it does not take effect until 1959." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 3, 26, 29.

461. Expert Kipp also determined that "Mr. White's use of these two sets of data—the slop reduction data for the period of 1946 to 1951, and the oil content reduction in the wastewater effluent data for the period of 1959 to 1971—in support of his process efficiency factors are not duplicative and in fact are quite conservative for the following reasons. First, the two sets of data are not duplicative because the data is reflective of different, non-overlapping time periods (i.e., 1946 to 1951 as compared to 1959 to 1971) and concern different criteria (i.e, slop reduction for 1946 to 1951 and oil content reduction in the wastewater for 1959 to 1971). In short, there is no possibility that Mr. White's use of this data results in double-counting of process efficiency factors. Second, Mr. White's use of these two sets of data is conservative because there is no quantitative data of the slop reductions or oil content reductions in the wastewater during the period of time between the data points—the 1951 to 1959 period—even though it is very likely that the Baton Rouge facility achieved greater slop reductions as well as oil content reductions during this 1951 to 1959 period because during this period the facility was implementing process control and waste processing improvements that would have improved the facility's environmental performance." Ex. 2, Att. C, Kipp 2016 Supp. Rpt. at 28–29.

VI. The Federal Nexus[18] to the Waste Units and Areas of Contamination That Are the Subject of Exxon's Response Actions

A. Baytown Facility

462. Figure 1, Baytown Map, which is attached to this pleading, is an aerial photograph of the Baytown Facility depicting the current or former locations of the waste units

[18] The term "Federal nexus" means that there is a connection or nexus between the historical waste and/or contamination for which Exxon has incurred or may incur cleanup costs to address and the United States or Federal Government. This connection or nexus exists if the waste and/or contamination resulted from production or other operations at the facility at issue—in this case the Baytown or Baton Rouge Facilities—during a period of wartime activities or related to or occurring as a result of wartime activities.

and areas of contamination that are the subject of Exxon's response actions at the Baytown Facility.

463. Separator 10 (Solid Waste Management Unit No. "SWMU") 8 is a former unlined oil/water separator located in the southern part of the Baytown Facility. *See* Figure 1, Baytown Map. Separator 10 was a clay-bottomed separator that operated as the Baytown Facility's main oil-water separator during the period of approximately 1929 to 1982. In late 1982, new Separator 12 replaced Separator 10 as the main oil/water separator, and Separator 10, which was renamed Spill Basin 1 at that time, was removed from service as an oil/water separator. A000825; A002352–A002364; A003614; A003615; A003723; A003616–A003704; Ex. 6, Att. B, Gravel 2012 Rpt. at 111–13; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 83–84.

464. There is a Federal nexus to Separator 10 and related contamination that have been the subject of Exxon response actions.[19] Separator 10 received and processed wastes and wastewaters generated by the following wartime operations at the Baytown Facility: (a) wastewaters generated by the operation of the refinery during the period of 1941 to 1953; (b) wastewaters generated by the operation of the BOW during its period of operation; (c) certain wastes and waste streams generated by the operation of the Butadiene Plancor 485, including quench oil emulsion (i.e., 740 gallons per minute ("gpm") containing 3,000 to 5,000 ppm of oil), steam condensate (15 to 20 gpm) containing tertiary butyl alcohol and caustic, and slop oil, during its period of operation; (d) certain wastes and waste streams generated by the Butyl Rubber Plancor 1082, including naphtha skimmings and slop oil, during its period of operation; and (e) wastewaters generated by the Hydrocodimer Plancor 1909 during its period of operation. A000825; A002352–A002364; A001097; A001295–A001304; A001305–A001309; A001310–A001316; A001399–A001408; A001562–A001565; Ex. 6, Att. B, Gravel 2012 Rpt. at 111–13; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 83–84. Based on these and related factual findings, according to experts Jere M. Johnson and A. J. Gravel, Separator 10 was used during the period of 1941 to 1955 for the processing of wastewaters generated by the wartime operations during the period of 1941 to 1955, and therefore, subsequent response activities regarding the historical waste and contamination at Separator 10 being conducted by Exxon are attributable to the wastes and wastewaters generated by the wartime operations during the period of 1941 to 1955. Ex. 6, Att. B, Gravel 2012 Rpt. at 113–14; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 85.

465. Separator 3M (SWMU 70), which was originally referred to as Separator 3 or "Old Separator 3," is a former surface impoundment that was located in the southern part of the Baytown Facility near former Separator 10. *See* Figure 1, Baytown Map. Separator 3M operated during the period of approximately 1927 to 1985, and was used for the storage of oily sludge generated by the waste processing operations at Separator 10 and old Separator 12. A003703; A002364–A002365; A003709; A003724; A003710; A003616–A003704; A003711; Ex. 6, Att. B, Gravel 2012 Rpt. at 111–13; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 85.

466. There is a Federal nexus to Separator 3M and related contamination that have been the subject of Exxon response actions. Much of the sludge generated by Separator 10 and

[19] Section VII describes Exxon's response actions for each of the waste units and areas of contamination identified in this section.

stored in Separator 3M resulted from Separator 10's processing of wastewaters generated by the following wartime operations: (a) wastewaters generated by the operation of the refinery during the period of 1941 to 1953; (b) wastewaters generated by the operation of the BOW during its period of operation; (c) certain wastes and waste streams generated by the operation of the Butadiene Plancor 485, including quench oil emulsion (i.e., 740 gpm containing 3,000 to 5,000 ppm of oil), steam condensate (15 to 20 gpm) containing tertiary butyl alcohol and caustic, and slop oil, during its period of operation; (d) certain wastes and waste streams generated by the Butyl Rubber Plancor 1082, including naphtha skimmings and slop oil, during its period of operation; and (e) wastewaters generated by the Hydrocodimer Plancor 1909 during its period of operation. *See* PF ¶ 464. Based on these and related factual findings, according to experts Jere M. Johnson and A. J. Gravel, Separator 3M was used for processing, storage and disposal of wastes and wastewaters generated by the wartime operations during the period of 1941 to 1955, and therefore, subsequent response activities regarding the historical waste and contamination at Separator 3M being conducted by Exxon are attributable in part to the residual sludge and contaminated soils removed from Separator 3M or in its vicinity by Exxon during response activities were attributable to the wastes and wastewaters generated by the wartime operations during the period of 1941 to 1955. Ex. 6, Att. B, Gravel 2012 Rpt. at 113–14; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 85.

467. <u>Upper Outfall Canal (UOC") and Lower Outfall Canal ("LOC") (collectively, SWMU 10)</u>, which were originally collectively referred to as the singular Outfall Canal, are earthen, unlined drainage canals located on the southern part of the Baytown Facility just south of former Separator 10 and near the former Separator 3M and old Separator 12. *See* Figure 1, Baytown Map. The UOC and LOC conveyed wastewater effluent discharged from Separators 10 and 12 to the Houston Ship Channel beginning in the early 1930s. At least during the 1940s and early 1950s, the UOC and LOC handled over 90 percent of all oily wastewaters generated at the Baytown Facility. The LOC ceased to be used for the conveyance of such wastewaters when a hurricane levee was constructed that physically separated it from the UOC in the mid-1970s, and the UOC ceased to be used for the conveyance of such wastewaters in the early 1990s. A002352–A002353, A002364–A002365; A003614; A003709; A003724; A003710; A003712–A003713; A003716.

468. According to expert Jere Johnson, Separator 10 and old Separator 12 were very inefficient during the WWII period, and as a result the wastewater effluent that was conveyed to the Outfall Canal contained large quantities of oil and oily sediments, and some of this was deposited in the bottom and on the sides of the Outfall Canal, and therefore, also migrated to some extent into the underlying subsurface soils and groundwater. Ex. 8, Att. B, J. Johnson 2012 Rpt. at 82; A003717–A003718.

469. There is a Federal nexus to the UOC and LOC and related contamination that have been the subject of Exxon response actions. Much of the wastewaters received by the UOC and LOC from Separator 10 were the result of Separator 10's processing of wastes and wastewaters generated by the following wartime operations: (a) wastewaters generated by the operation of the refinery during the period of 1941 to 1953; (b) wastewaters generated by the operation of the BOW during its period of operation; (c) certain wastes and waste streams generated by the operation of the Butadiene Plancor 485, including quench oil emulsion (i.e., 740 gpm containing 3,000 to 5,000 ppm of oil), steam condensate (15 to 20 gpm) containing

tertiary butyl alcohol and caustic, and slop oil, during its period of operation; (d) certain wastes and waste streams generated by the Butyl Rubber Plancor 1082, including naphtha skimmings and slop oil, during its period of operation; and (e) wastewaters generated by the Hydrocodimer Plancor 1909 during its period of operation. *See* PF ¶ 464. Based on these and related factual findings, according to experts Jere M. Johnson and A. J. Gravel, the UOC and LOC were used for the conveyance of wastewaters generated by the wartime operations during the period of 1941 to 1955, and therefore, subsequent response activities regarding the historical waste and contamination at the UOC and LOC being conducted by Exxon are attributable to the wastes and wastewaters generated by the wartime operations during the period of 1941 to 1955. Ex. 6, Att. B, Gravel 2012 Rpt. at 115–16; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 82–83.

470. South Landfarm (SWMU 3) is a former unlined landfill and landfarm located in the southern part of the Baytown Facility on land known as Blackwell Peninsula that is situated between the Houston Ship Channel and Black Duck Bay. *See* Figure 1, Baytown Map. The area was used as a landfill for the disposal of refinery wastes prior to 1974, and then used as a landfarm for the treatment and disposal of oily sludge and other wastes during the period of 1974 to the late 1980s. A003616–A003704.

471. There is a Federal nexus to the South Landfarm and related contamination that have been the subject of Exxon response actions. As a result of the waste unit's use as a landfill prior to 1974, the waste unit contains hydrocarbon-containing wastes and leaded tank bottoms existing at depths of six to eight feet and greater at various locations. Then, during the brief period that it was used as a landfarm, a significant amount of the wastes placed in the landfarm were the sludge and contaminated soils removed from Separators 3M and 10 during the latter waste units' cleanup. A003616–A003704. Based on these and related factual findings, according to experts Jere M. Johnson and A. J. Gravel, some of the residual sludge and contaminated soils removed from Separators 3M and 10 or in their vicinity were attributable to the wastes and wastewaters generated by the wartime operations and processed at Separator 10 during the period of 1941 to 1955. Ex. 6, Att. B, Gravel 2012 Rpt. at 113–16; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 82–83, 85. This same residual sludge and contaminated soils was disposed of at the South Landfarm, and therefore, according to expert A. J. Gravel the subsequent response activities regarding the historical waste and contamination at the South Landfarm being conducted by Exxon are in part intended to address wastes generated by the wartime operations during the period of 1941 to 1955. Ex. 6, Att. B, Gravel 2012 Rpt. at 115.

472. Velasco Street Ditch ("VSD") (SWMU 22), which at one time was referred to as the East Ditch, is an earthen drainage canal located in the northeast part of the Baytown Facility. *See* Figure 1, Baytown Map. The VSD conveyed wastewaters, stormwater runoff, tank water draws containing some oil and emulsions from large crude oil tanks in the north part of the Baytown Facility, and possibly oily runoff from the waste clay pile, beginning in approximately 1928. A002353, A002364–A002365; A003719–A003721; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 82. In the early 1990s, the VSD was the subject of a cleanup / "delay of closure" and therefore, beginning in the early 1990s, the waste unit was subsequently only used for the management and conveyance of non-hazardous waste. Then in 2008, the VSD was the subject of a "clean closure," and therefore, beginning in 2008 was only active as a clean stormwater conveyance ditch. A002353, A002364–A002365; A003719–A003721; A003614; A003723.

473. There is a Federal nexus to the VSD and related contamination that have been the subject of Exxon response actions. During the period of 1941 to 1955, the VSD conveyed wastewaters, stormwater runoff, tank water draws containing some oil and emulsions from large crude oil tanks in the north part of the Baytown Facility, and possibly oily runoff from the waste clay pile. A002353, A002364–A002365; A003719–A003721; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 82. Based on these and related factual findings, according to experts Jere M. Johnson and A. J. Gravel, the VSD was used for the conveyance of some of the wastes and wastewaters generated by the wartime operations during the period of 1941 to 1955 at the Baytown Facility, and therefore, subsequent response activities regarding the historical waste and contamination at the VSD conducted by Exxon are attributable to the wastes and wastewaters generated by the wartime operations during the period of 1941 to 1955. Ex. 6, Att. B, Gravel 2012 Rpt. at 119–20; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 82.

474. SWMU 47 (Waste Clay Pile) is a former earthen waste disposal area located in the north-central part of the Baytown Facility. A003469–A003587; *see also* Figure 1, Baytown Map.

475. There is a Federal nexus to SWMU 47 and related contamination that have been the subject of Exxon response actions. SWMU 47 was used as a disposal area for more than one million tons of contaminated clay that had been used to filter in-process fuels and lubricating oils, such as aviation lube oils and Navy lube oils, and operated during the period of approximately 1930 to 1977. A003469–A003587. Based on these and related factual findings, according to experts Jere M. Johnson and A. J. Gravel, SWMU 47 was used for the disposal of wastes generated by the wartime operations during the period of 1941 to 1955, and therefore, subsequent response activities regarding the historical waste and contamination at SWMU 47 being conducted by Exxon are attributable in part to the wastes generated by the wartime operations during the period of 1941 to 1955. A003469–A003587; Ex. 6, Att. B, Gravel 2012 Rpt. at 131; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 88.

476. SWMU 59 (Old Sludge Pit) is a former earthen sludge pit located in the southwestern part of the Baytown Facility near its dock areas and adjacent to part of the Mitchell Bay shoreline. A003469–A003587; *see also* Figure 1, Baytown Map.

477. There is a Federal nexus to SWMU 59 and related contamination that have been the subject of Exxon response actions. SWMU 59 was used for the storage and disposal of sludge that was primarily generated by the operation of the nearby Separator 2 (SWMU 69) during the period of approximately 1927 to 1947. A003469–A003587. Based on these and related factual findings, according to experts Jere M. Johnson and A. J. Gravel, SWMU 59 was used for storage and disposal of some of the wastes generated by the wartime operations during the period of approximately 1941 to 1947, and therefore, subsequent response activities regarding the historical waste and contamination at SWMU 59 being conducted by Exxon are attributable in part to the wastes generated by the wartime operations during the approximate period of 1941 to 1947. A003469–A003587; Ex. 6, Att. B, Gravel 2012 Rpt. at 131; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 88.

478. SWMU 60 (Mitchell Point) is a former waste disposal area located in the southwestern part of the Baytown Facility on an area known as Mitchell Point adjacent to part of Mitchell Bay. A003469–A003587; *see also* Figure 1, Baytown Map.

479. There is a Federal nexus to SWMU 60 and related contamination that have been the subject of Exxon response actions. SWMU 60 was used for the disposal of oily sludge, dredge spoils and possibly butyl rubber waste from the Butyl Rubber Plancor 1082, and operated during the period of approximately 1930 to 1972. A003469–A003587. Based on these and related factual findings, according to experts Jere M. Johnson and A. J. Gravel, SWMU 60 was used for the disposal of some of the wastes generated by the wartime operations during the period of 1941 to 1955, and therefore, subsequent response activities regarding the historical waste and contamination at SWMU 60 being conducted by Exxon are attributable in part to the wastes generated by the wartime operations during the period of 1941 to 1955. A003469–A003587; Ex. 6, Att. B, Gravel 2012 Rpt. at 131; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 88.

480. SWMU 62 (Main Office Building) is an approximate 50-acre former waste processing and disposal area located in the northeast part of the Baytown Facility where part of this area is now covered by the Main Office Building and associated parking lot. This area was also commonly referred to as the North Tank Farm during the wartime period. A003469-A003587; *see also* Figure 1, Baytown Map.

481. There is a Federal nexus to SWMU 62 and related contamination that have been the subject of Exxon response actions. SWMU 62 included a landfill, which operated during the approximate period of 1919 to 1971, an oil-water separator known as Separator 9, which operated during the approximate period of 1928 to 1951, old burn pits, and a garbage disposal area. The landfill was used for the disposal of oily sludge and general refinery wastes, and Separator 9 was used to process wastewaters discharged from the VSD. A002353; A002364; A003469–A003587; A003614–A003723; Ex. 6, Att. B, Gravel 2012 Rpt. at 131–32; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 86–87, 89. A Government report issued in 1946 stated that the sludge resulting from the processing of oil slop sent from the Butadiene Plancor 485 to the refinery for waste treatment was disposed of at SWMU 62, stating "[t]he oil slop collected from the surface of the water is pumped to the refinery for treatment and reused and the sludge, removed manually, is transported to the North Tank Farm." A001297; A001304. In addition, a related Government report issued in 1946 stated that the Butyl Rubber Plancor 1082 sent oil polymer wastes to the North Tank Farm for burning. A001401, A001408. Based on these and related factual findings, according to experts Jere M. Johnson and A. J. Gravel, SWMU 62 was used for the processing and disposal of some of the wastes generated by the wartime operations during the period of 1941 to 1955, and therefore, subsequent response activities regarding the historical waste and contamination at SWMU 62 being conducted by Exxon are attributable in part to the wastes generated by the wartime operations during the period of 1941 to 1955. Ex. 6, Att. B, Gravel 2012 Rpt. at 131–32; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 86–87, 89.

482. SWMU 64 (Landfill Near the VSD) is a former landfarm that was located in the northeast part of the Baytown Facility near the VSD. A003469–A003587; *see also* Figure 1, Baytown Map.

483. There is a Federal nexus to SWMU 64 and related contamination that have been the subject of Exxon response actions. SWMU 64 was used for the disposal of crude oil tank bottoms during the period of approximately 1930 to 1971. Based on these and related factual findings, according to experts Jere M. Johnson and A. J. Gravel, SWMU 64 was used for the disposal of some of the wastes generated by the wartime operations during the period of 1941 to 1955, and therefore, subsequent response activities regarding the historical waste and contamination at SWMU 64 being conducted by Exxon are attributable in part to the wastes generated by the wartime operations during the period of 1941 to 1955. A003469–A003587; Ex. 6, Att. B, Gravel 2012 Rpt. at 132; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 89.

484. SWMU 69 (Separator 2) is a former earthen, oil-water separator that was located in the southwestern part of the Baytown Facility near its dock area and adjacent to part of the Mitchell Bay shoreline. A003469–A003587; *see also* Figure 1, Baytown Map.

485. There is a Federal nexus to SWMU 69 and related contamination that have been the subject of Exxon response actions. SWMU 69 was used for the processing of wastewater from the refinery's tankage and other areas southwest of the refinery, and also received additional wastewaters in the event of an overflow of the baffle in the West Ditch, which would include wastewater from all process units in the west part of the refinery, as well as the wastewater generated by the BOW and the Hydrocodimer Plancor 1909 during the wartime period. SWMU 69 operated during the period of approximately 1927 to 1960. SWMU 69 was used for the processing of some of the wastewaters generated by the wartime operations during the period of 1941 to 1955, and therefore, subsequent response activities regarding the historical waste and contamination at SWMU 69 being conducted by Exxon are attributable in part to the wastewaters generated by the wartime operations during the period of 1941 to 1955. A002353; A002356; A002364; A003469–A003587; Ex. 6, Att. B, Gravel 2012 Rpt. at 131; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 86.

486. SWMU 70 (Separator 3M) is an area that primarily includes Separator 3M (i.e., old Separator 3) and is located in the south part of the Baytown Facility adjacent to part of the UOC and near former Separator 10. A003587; *see also* Figure 1, Baytown Map.

487. There is a Federal nexus to SWMU 70 and related contamination that have been the subject of Exxon response actions. Separator 3M was used for the storage of oily sludge generated by the waste processing operations at Separator 10 and old Separator 12 during the approximate period of 1927 to 1985. During the wartime period of 1941 to 1955, much of the sludge generated by Separator 10 and stored in Separator 3M resulted from Separator 10's processing of wastewaters generated by the following wartime operations: (a) wastewaters generated by the operation of the refinery during the period of 1941 to 1953; (b) wastewaters generated by the operation of the BOW during its period of operation; (c) certain wastes and waste streams generated by the operation of the Butadiene Plancor 485, including quench oil emulsion (i.e., 740 gpm containing 3,000 to 5,000 ppm of oil), steam condensate (15 to 20 gpm) containing tertiary butyl alcohol and caustic, and slop oil, during its period of operation; (d) certain wastes and waste streams generated by the Butyl Rubber Plancor 1082, including naphtha skimmings and slop oil, during its period of operation; and (e) wastewaters generated by the Hydrocodimer Plancor 1909 during its period of operation. *See* PF ¶ 464. SWMU 70 was used for the storage and disposal of some of the wastes generated by the wartime operations

during the period of 1941 to 1955, and therefore, subsequent response activities regarding the historical waste and contamination at SWMU 70 being conducted by Exxon are attributable in part to the wastes generated by the wartime operations during the period of 1941 to 1955. A003587; A003709; A003724; A003710; AA003615; A003616–A003704; A002364–A002365; Ex. 6, Att. B, Gravel 2012 Rpt. at 111–13; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 85.

488. SWMU 71 (Old Separator 12) is an area that includes old Separator 12 and is located in the south part of the Baytown Facility near Separator 3M and the LOC. A003469–A003587; *see also* Figure 1, Baytown Map.

489. There is a Federal nexus to SWMU 71 and related contamination that have been the subject of Exxon response actions. Old Separator 12 (i.e., SWMU 71) was used for the processing of overflow wastewater entering Separator 3M from Separator 10 and water from emulsion-breaking tanks, and Separator 12 discharged the resulting wastewater effluent into the Outfall Canal and the sludge into Separator 3M. Old Separator 12 operated during the approximate period of 1930 to 1956. A003469–A003587; A002354, A002364; A003614. Based on these and related factual findings, according to experts Jere M. Johnson and A. J. Gravel, SWMU 71 was used for the processing of wastes and wastewaters generated by the wartime operations during the period of 1941 to 1955, and therefore, subsequent response activities regarding the historical waste and contamination at SWMU 71 being conducted by Exxon are attributable in part to the wastes and wastewaters generated by the wartime operations during the period of 1941 to 1955. A003469–A003587; A002354, A002364; A003614; Ex. 6, Att. B, Gravel 2012 Rpt. at 132; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 85–86.

490. SWMU 72 (Sludge Pit) is a former earthen sludge pit that was located in the central part of the Baytown Facility. A003587; *see also* Figure 1, Baytown Map.

491. There is a Federal nexus to SWMU 72 and related contamination that have been the subject of Exxon response actions. SWMU 72 was used for the storage and disposal of oily sludge and spent caustics generated by refinery operations during the approximate period of 1927 to 1956. Based on these and related factual findings, according to experts Jere M. Johnson and A. J. Gravel, SWMU 72 was used for the storage and disposal of wastes generated by the wartime operations during the period of 1941 to 1955, and therefore, subsequent response activities regarding the historical waste and contamination at SWMU 72 being conducted by Exxon are attributable in part to the wastes generated by the wartime operations during the period of 1941 to 1955. A003587; Ex. 6, Att. B, Gravel 2012 Rpt. at 132; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 89.

492. SWMU 73 (Sludge Pit) is a former earthen sludge or slush pit that was located in the central part of the Baytown Facility. A003587; *see also* Figure 1, Baytown Map.

493. There is a Federal nexus to SWMU 73 and related contamination that have been the subject of Exxon response actions. SWMU 73 was used for the storage and disposal of oily sludge during the approximate period of 1927 to the mid-1950s. A003587. Based on these and related factual findings, according to experts Jere M. Johnson and A. J. Gravel, SWMU 73 was used for the storage and disposal of some of the wastes generated by the wartime operations during the period of 1941 to the mid-1950s, and therefore, subsequent response activities

regarding the historical waste and contamination at SWMU 73 being conducted by Exxon are attributable in part to the wastes generated by the wartime operations during the period of 1941 to the mid-1950s. A003587; Ex. 6, Att. B, Gravel 2012 Rpt. at 132; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 89.

494. SWMU 74 (Separator 1) is a former earthen oil-water separator (i.e., Separator 1) that was located in the south central part of the Baytown Facility. A003469–A003587. *See* Figure 1, Baytown Map.

495. There is a Federal nexus to SWMU 74 and related contamination that have been the subject of Exxon response actions. Separator 1 (i.e., SWMU 74) was used to treat process wastewaters during the approximate period of 1927 to the early to mid-1950s. Based on its location near fluid catalytic cracking unit no. 1, it is likely that Separator 1 was used to treat process wastewater generated by the production of avgas, and butadiene and butyl rubber raw materials produced at the refinery for use at the Butadiene and Butyl Rubber Plancors during the period of 1941 to the early to mid-1950s. A002353, A002352, A002364; A003469–A003587; A003614; A003723. According to experts Jere M. Johnson and A. J. Gravel, SWMU 74 was used for the processing of some of the wastewaters generated by the wartime operations during the period of 1941 to the mid-1950s, and therefore, subsequent response activities regarding the historical waste and contamination at SWMU 74 being conducted by Exxon are attributable in part to the wastewaters generated by the wartime operations during the period of 1941 to the mid-1950s. A002353; A002362, A002364; A003469–A003587; A003723; Ex. 6, Att. B, Gravel 2012 Rpt. at 133; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 87.

496. Waste Management Area-1 ("WMA-1") is a specific area of the Baytown Facility where the groundwater is contaminated with phase-separated (i.e., free phase) and dissolved phase petroleum hydrocarbons in the south part of the Baytown Facility. In the mid-1990s the Texas Natural Resources Conservation Commission ("TNRCC") designated this specific area of groundwater contamination as WMA-1. WMA-1 generally encompasses a number of the wartime-related waste units, including the UOC, the former location of Separator 3M, SWMU 70, and SWMU 71. WMA-1 is also just south of former Separator 10 and adjacent to the LOC. A003727–A003728; *see also* Figure 1, Baytown Map.

497. There is a Federal nexus to the groundwater contamination at WMA-1 that have been the subject of Exxon response actions. In the late 1990s, the TNRCC determined that the sources of the groundwater contamination at WMA-1 were historical releases of hazardous waste from the following waste units: (a) the UOC; (b) old Separator 3 / SWMU 70 (i.e., Separator 3M); (c) Old Separator 12 / SWMU 71; and (d) the Wastewater Oxidation Unit, which was constructed in the mid-1980s at the former location of the south half of Separator 3M. A003727-A003728. Numerous factual findings set forth above describe the Federal nexus to the UOC, Separator 3M and Old Separator 12/SWMU 71. *See* PF ¶¶ 464, 466, 469, 489. Based on these and related factual findings, according to experts Jere M. Johnson and A. J. Gravel, some of the hazardous wastes from Separators 3M and 12 and the UOC that were the source of the groundwater contamination at WMA-1 were generated by the wartime operations during the period of 1941 to 1955, and therefore, subsequent response activities regarding the groundwater contamination at WMA-1 being conducted by Exxon are attributable in part to wastes generated by the wartime operations during the period of 1941 to 1955. A003727–

A003728; Ex. 6, Att. B, Gravel 2012 Rpt. at 112–13, 116–17; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 82–86.

498. Refinery Plume Areas are specific areas where there are groundwater contaminant plumes containing both phase-separated and dissolved phase petroleum hydrocarbons that were identified by the TNRCC in 1995 as existing at the following locations at the Baytown Facility: (a) Plume Area 1—located under a Tankfarm east of Docks 2 and 4 in the southwest part of the Baytown Facility; (b) Plume Area 2—located under an area just north and east of Dock 1 in the southwest part of the Baytown Facility; (c) Plume Area 3—located in the southern part of the refinery between Dock 1 and the Wastewater Oxidation Unit in the south part of the Baytown Facility; and (d) Plume Area 4—located under a tankfarm north of Bayway Drive and south of San Jacinto Avenue in the south central part of the Baytown Facility. Each of the Plume Areas has one to four separate sub-plumes. A006135–A006182; Ex. 6, Att. B, Gravel 2012 Rpt. at 43 (Figure 5), 124; *see also* Figure 1, Baytown Map.

499. There is a Federal nexus to the groundwater contamination at Plume Area 1 that has been the subject of Exxon response actions. First, Plume Area 1 is located underneath SWMUs 59 and 69 which have a Federal nexus. *See* PF ¶¶ 477, 485. Second, Plume Area 1 is in proximity to pipelines formerly owned by the Government; specifically, residue gas from Butadiene Plancor 485, tail gas from the BOW, "lean" absorption oil, and selective polymers, which were transported from storage tanks to the Hydrocodimer Plancor 1909 through a series of pipelines in proximity to Plume Area 1, and after processing of these materials, various related materials, including hydropolymer, stabilized distillate, low pressure vent gas, stabilized residual gas, absorber residual gas, heavy polymer, and spent lean oil were returned via adjacent pipelines in proximity to Plume Area 1 from Plancor 1909 to the storage tanks. During the period of 1941 to 1955, the operation of SWMUs 59 and 69 would have caused releases of hazardous wastes to the subsurface, and these types of pipelines and tanks would have spilled, leaked or otherwise released some of hazardous materials and substances into the underlying subsurface, contributing to the groundwater contamination at Plume Area 1. A003729–A003737; A003738–A003749; Ex. 6, Att. B, Gravel 2012 Rpt. at 128–29. Based on these and related factual findings, according to expert A. J. Gravel, some of the hazardous wastes and other hazardous substances that were the source of the groundwater contamination at Plume Area 1 were generated by the wartime operations during the period of 1941 to 1955, and therefore, subsequent response activities regarding the groundwater contamination at Plume Area 1 being conducted by Exxon are attributable in part to hazardous wastes and substances generated by the wartime operations during the period of 1941 to 1955. Ex. 6, Att. B, Gravel 2012 Rpt. at 128–29.

500. There is a Federal nexus to the groundwater contamination at Plume Areas 2 and 3 that have been the subject of Exxon response actions. First, Plume Areas 2 and 3 are near the ship loading docks and several tank farms that were at least partially served by Federally-owned pipelines. These areas were used for the storage and transfer of petroleum feedstocks, intermediates and related products during the 1940s and 1950s. Second, based on prior investigations of these plume areas, there is a diverse range of petroleum products present in these plumes areas, including diesel fuel, lube oils, reduced crude, No. 5 fuel oil and heating oil, and a number of similar or related products which were manufactured under Government war contracts and shipped from Baytown during the wartime period, such as fuel oil, Navy fuel oil,

gasoline fuel oil, fuel kerosene, and lubricating oils. A003750–A003751; A003752–A003756. Third, Plume Area 3 is immediately downgradient of SWMUs 70 and 71 which have a Federal nexus. *See* Figure 1, Baytown Map; PF ¶¶ 487, 489. During the period of 1941 to 1955, the operation of SWMUs 70 and 71 would have caused releases of hazardous wastes to the subsurface, and these types of pipelines and tanks would have spilled, leaked, or otherwise released some of hazardous materials and substances into the underlying subsurface, contributing to the groundwater contamination at Plume Areas 2 and 3. A003750–A003751; A003752–A003756; A003727; Ex. 6, Att. B, Gravel 2012 Rpt. at 118, 128–29. Based on these and related factual findings, according to expert A. J. Gravel, some of the hazardous wastes and other hazardous substances that were the source of the groundwater contamination at Plume Areas 2 and 3 were generated by the wartime operations during the period of 1941 to 1955, and therefore, subsequent response activities regarding the groundwater contamination at Plume Areas 2 and 3 being conducted by Exxon are attributable in part to hazardous wastes and substances generated by the wartime operations during the period of 1941 to 1955. Ex. 6, Att. B, Gravel 2012 Rpt. at 128–29.

501. There is a Federal nexus to the groundwater contamination at Plume Area 4 that have been the subject of Exxon response actions. First, Plume Area 4 is in the vicinity of various former BOW off-site[20] tanks, pipelines, and pumps, which were installed at Treater No. 1A, Treater No. 16 and the Aviation Rerun Unit No. 2 at the Baytown refinery. At least 45 pipelines were installed throughout the refinery to support the BOW operations. These pipelines included 10 lines for the naphtha delivery system, 22 lines that transported by-products to tanks within the refinery, and 6 lines that were part of the anti-solvent system. The Government also arranged for the installation of twelve 20,000-barrel storage tanks for the use and operation of the BOW outside of the BOW and within the refinery. The tanks were located to the east of the BOW and included Tanks 578, 579, 761 to 768, 775, and 776. Tanks 578 and 579 were equipped with catch basins and drainage lines that conveyed wastewater to the existing refinery sewer near Treater No. 14 located west of San Jacinto Avenue and adjacent to Tank 902. Drainage equipment for the ten 700-area tanks consisted of 15 catch basins connected by a 10-inch concrete pipe to a refinery sewer. These tanks were located in the vicinity of sub-plume 4-1. A003759–A003764; A001096; A003765–A003768; A003716. Second, the Government used and leased tanks in the vicinity of sub-plumes 4-2, 4-3 and 4-4 that were dedicated to the storage of avgas and other war products, as these products awaited shipment via the Government's War Emergency Pipeline. A003769–A003771. Third, Plume Area 4 is where some of the former Hydrocodimer Plancor 1909 facilities were located and operated. Both Plancor 1909 production facilities and supporting tankage were served by an extensive system of Federally-owned pipelines, and all of these lines were subject to normal operating leaks and releases. Some of these pipelines ran through and near sub-plumes 4-1, 4-2, and 4-3. A003789; A003792; A003797–A003798; A003800–A003801. Fourth, sub-plume 4-3 was characterized as containing blue-dyed avgas, which corresponds with the dye added to certain avgas in compliance with Federal specifications to distinguish different grades of avgas during WWII. A003804, A003805, A003807. During the period of 1941 to 1955, these types

[20] The use of the term "off-site" is meant to indicate that these tanks and pipings were not located within the confines of the actual BOW plant, but were located elsewhere at the Baytown Facility, and were part of the BOW infrastructure owned by the Government or operated to support the BOW. These tanks and pipings were located in the vicinity of Plume Area 4.

of pipelines, tanks, pumps, catch basins, drainage lines, and sewers would have spilled, leaked or otherwise released some hazardous wastes, materials and substances into the underlying subsurface, contributing to the groundwater contamination at Plume Area 4. Ex. 6, Att. B, Gravel 2012 Rpt. at 124–29. Based on these and related factual findings, according to expert A. J. Gravel, some of the hazardous wastes and other hazardous substances that were the source of the groundwater contamination at Plume Area 4 were generated by the wartime operations during the period of 1941 to 1955, and therefore, subsequent response activities regarding the groundwater contamination at Plume Area 4 being conducted by Exxon are attributable in part to hazardous wastes and substances generated by the wartime operations during the period of 1941 to 1955. Ex. 6, Att. B, Gravel 2012 Rpt. at 124–29.

502. Tankfarm 3000 Area is a specific area at the Baytown Facility where the groundwater is contaminated with phase-separated (i.e., free phase) and dissolved phase petroleum hydrocarbons in the north central part of the Baytown Facility. The area where the groundwater contaminant plume is located is currently known as the Tankfarm 3000 Area but much of this area was the site of the former BOW during WWII. Ex. 6, Att. B, Gravel 2012 Rpt. at 43 (Figure 5), 121.

503. There is a Federal nexus to the groundwater contamination at the Tankfarm 3000 Area that have been the subject of Exxon response actions. First, the location of the groundwater contaminant plume corresponds with the location of the key production and storage facilities of the former BOW. A003723–A003724; A003710–A003711; A003808–A003812; A001073; Ex. 6, Att. B, Gravel 2012 Rpt. at 121–22. Second, there is a correlation between the nature of most of the contaminants found in the groundwater contaminant plume and the types of products, byproducts, feed stocks/raw materials or wastes associated with the BOW operations during WWII, and examples include toluene, naphtha, xylene, kerosene, paraffins and reformate. A003862–A003872; Ex. 6, Att. B, Gravel 2012 Rpt. at 122. Third, more than 25 Government-owned raw materials and finished product storage tanks as well as underground pipelines served the BOW and all of these tanks and pipelines were possible sources of leaks, spills and releases of hazardous waste or materials to the subsurface soils and the groundwater in the current Tankfarm 3000 Area. A003818; A003819–A003844; A001073; A003723–A003724; A003710–A003711; Ex. 6, Att. B, Gravel 2012 Rpt. at 122. Fourth, the BOW operations included three open earthen dump sites for the disposal of spent catalyst on the BOW site itself that may have contributed to subsurface groundwater contamination. A001156, A001157–A001158, A001162–A001164, A001166; Ex. 6, Att. B, Gravel 2012 Rpt. at 122–23. Fifth, a 1988 hydrocarbon source investigation determined that the source of the groundwater contamination was historic in nature. A003845–A003860; Ex. 6, Att. B, Gravel 2012 Rpt. at 121; Ex. 6, Att. C, Gravel 2012 Rebuttal Rpt. at 32–34. Based on these and related factual findings, according to expert A. J. Gravel, some of the hazardous wastes and other hazardous substances that were the source of the groundwater contamination at the Tankfarm 3000 Area were generated by the wartime operations at the BOW during the period of 1941 to 1945, and therefore, subsequent response activities regarding the groundwater contamination at the Tankfarm 3000 Area being conducted by Exxon are attributable in part to hazardous wastes and substances generated by the wartime operations during the period of 1941 to 1945. Ex. 6, Att. B, Gravel 2012 Rpt. at 121–23; Ex. 6, Att. C, Gravel 2012 Rebuttal Rpt. at 32–34.

504. The contaminants or constituents of concern in the groundwater contaminant plume at the Tankfarm 3000 Area are constituents common to feedstocks processed at the BOW or products or byproducts manufactured at the BOW. Ex. 11, Att. B, Gagnon 2012 Rebuttal Rpt. at 11–14. First, one of the constituents of concern was naphtha, and virgin and CAT naphtha was a feedstock in the manufacture of toluene at the BOW. A003867; A003873–A003877; A003813–A003818; A003880; Ex. 11, Att. B, Gagnon 2012 Rebuttal Rpt. at 13. Second, another constituent of concern was xylenes, and xylenes were one of the byproducts of the toluene production at the BOW. A003444–A003445; A003879; Ex. 11, Att. B, Gagnon 2012 Rebuttal Rpt. at 13. Third, reformate is present in the groundwater contaminant plume, and reformate was a byproduct of the operation of the hydroformer process unit at the BOW. A010337–A010338; A003861–A003872; Ex. 11, Att. B, Gagnon 2012 Rebuttal Rpt. at 13-14. Fourth, kerosene was one of the constituents of concern, and kerosene wash oil was used at the sulphur dioxide extraction plant at the BOW. A003886; A010298; Ex. 11, Att. B, Gagnon 2012 Rebuttal Rpt. at 13–14. Fifth, toluene is a constituent of concern, and nitration-grade toluene was the primary product at the BOW. A003867; A003889; Ex. 11, Att. B, Gagnon 2012 Rebuttal Rpt. at 14.

505. Two of the Government's expert witnesses concur that the BOW operations contributed to the groundwater contaminant plume at the Tankfarm 3000 Area. First, Government expert witness Matthew Low stated that, in regard to the Tankfarm 3000 Area groundwater contamination, "I believe it is reasonable to infer that operations during this period [1942-1946] could have impacted groundwater." Ex. 6, Att. C, Gravel 2012 Rebuttal Rpt. at 33 (quoting "Expert Report of Matthew Low" (Aug. 10, 2012) at 23). Second, Government expert witness Dr. James Kittrell stated "More likely than not, at least part of the contaminants in the BOW groundwater plume were deposited later than the WWII period . . . ." Ex. 6, Att. C, Gravel 2012 Rebuttal Rpt. at 34 (quoting "Expert Report of Dr. James Kittrell" (Aug. 10, 2012) at 41).

506. According to cost causation expert Paul Ficca, the "root cause" of the oily wastes released at Baytown during WWII was the Government's mandate to maximize the production of avgas and other war products. Ex. 3, Att. B, Ficca 2016 Rpt., Attachment 4A at 57–86.

B. Baton Rouge Facility

507. Figure 2, Baton Rouge Map, which is attached to this pleading, is an aerial photograph of the Baton Rouge Facility depicting the current or former locations of the waste units and areas of contamination that are the subject of Exxon's response actions at the Baton Rouge Facility.

508. Shallow Fill Zone is an expansive area of historical contaminated fill material in the "batture" area of the Baton Rouge Facility that is located adjacent to and east of the Mississippi River and west of the Illinois Central Gulf Railroad lines and the process and tankage areas of the Baton Rouge Facility. *See* Figure 2, Baton Rouge Map. The "batture" area is the low-lying, alluvial land adjacent to the Mississippi River that typically becomes flooded during most of the spring and early summer unless the land's elevation is raised artificially or protected by man-made levees. To prevent the periodic inundation and to allow productive use of the "batture" area at the Baton Rouge Facility, over a number of years fill materials, which

contained oily wastes, were placed in certain parts of this "batture" area, and these fill materials ranged in depth from 12 to 30 feet, creating the Shallow Fill Zone. The Shallow Fill Zone was the location of a number of waste processing facilities and waste units, including, for example, a number of oil/water separators, the Old Silt Pond, the Rice Paddy Landfarm and the Butyl Rubber Waste Landfill. Ex. 8, Att. B, J. Johnson 2012 Rpt. at 93–94; Ex. 6, Att. B, Gravel 2012 Rpt. at 211–13; A003892–A003894; A003899–A003902; *see also* Ex. 12, Pisani Decl.

509. Callaghan's Bayou was a natural bayou in the "batture" area at the Baton Rouge Facility. *See* Figure 2, Baton Rouge Map. Beginning in the early years of the Facility's operation, Callaghan's Bayou served as a canal to convey the wastewaters discharged by the Facility's oil/water separators to the Mississippi River. These wastewaters contained substantial amounts of oily silt and other wastes in the 1940s and early 1950s, until the Master Separator became operational in 1952. Ex. 8, Att. B, J. Johnson 2012 Rpt. at 93–94, 97; A003913; A003914–A003923; A003933; A003962; A003968; A003969–A003971.

510. Old Silt Pond (SWMU 2) is a former earthen waste disposal area that was located in the Shallow Fill Zone area on the western part of the Baton Rouge Facility adjacent to the Mississippi River and just south of Callaghan's Bayou. *See* Figure 2, Baton Rouge Map. The Old Silt Pond was an approximately 20-acre impoundment basin or pond that was constructed on the Shallow Fill Zone and became operational in October 1945, and continued operating until it reached its design capacity in the late 1950s. A004039–A004040. In the mid-1970s, a 5-acre part of the original 20-acre impoundment area commenced operations and continued to operate until the late 1980s. A003976. The Old Silt Pond area was also used for waste disposal activities and as a repository for wastes and wastewaters beginning at least as early as the early 1940s in various respects. *See* PF ¶¶ 512–17, 520–22 *infra.*

511. Rice Paddy Landfarm (SWMU 1) is a former earthen waste disposal area that was located in the Shallow Fill Zone area on the western part of the Baton Rouge Facility adjacent to the Mississippi River. *See* Figure 2, Baton Rouge Map. The Rice Paddy Landfarm operated during the approximate period of 1976 to 1988. A003999. Prior to its use as a landfarm, the Rice Paddy Landfarm area was used as a landfill for the disposal of refinery wastes since the early years of the refinery. According to an historical investigation conducted by a contractor for and on behalf of the EPA, "[p]rior to installation of the landfarm, the area beneath the unit was used as a landfill." A003999. EPA's contractor also determined that the Rice Paddy Landfarm area had been "used as a landfill since the early years of the refinery" "and the landfilled wastes included "sludges and miscellaneous wastes." A003999. The Rice Paddy Landfarm area was also used for other waste or wastewaters disposal activities and as a repository for waste and wastewaters beginning at least as early as the early 1940s in various respects. *See* PF ¶¶ 512, 514, 515, 518–22 *infra.*

512. There is a Federal nexus to the Shallow Fill Zone, Old Silt Pond, the Rice Paddy Landfarm areas and related contamination that have been the subject of Exxon response actions in numerous respects. *See* PF ¶¶ 513–22; *see also* Ex. 12, Pisani Decl. First, wastewaters containing oily silt, separator sludge and other waste materials flowed onto and contaminated the Shallow Fill Zone, including the Old Silt Pond and Rice Paddy Landfarm areas, during heavy rain events and the spring flooding season during the period of 1941 to 1952. Prior to 1952 when the Master Separator became operational, Callaghan's Bayou would overflow onto

the surrounding areas during heavy rain events and the annual spring flooding, and the overflowing, flood waters from Callaghan's Bayou contained substantial amounts of wastewaters that had been regularly discharging from the oil/water separators into the Bayou. There were approximately 28 rain events involving rainfall totals of two inches or more in Baton Rouge during the 1942 to 1945 period. A010340–A010399; Ex. 7, Att. B, Grip 2012 Rebuttal Rpt. at 11. The wastewaters contained significant amounts of oily solid wastes, principally oily silt and sludge, because at that time the Baton Rouge Facility used silty water from the Mississippi River as once-through cooling water, and the oil would become entrained on the silt in the cooling water during its use in process operations. In fact, prior to late 1945, the oily silt and sludge generated by and accumulating in the separators was periodically flushed from the separators into Callaghan's Bayou; it was estimated that 80,000 cubic yards of oily silt and sludge was annually deposited in the Bayou during the spring flooding season alone during that time period. When Callaghan's Bayou would overflow, much of this oily silt, sludge, and other waste materials would remain and settle in the surrounding Shallow Fill Zone, including the Old Silt Pond and Rice Paddy Landfarm areas. A003914–A003923; A003962; A004036; A004039–A004041; A003924–A003957; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 97; Ex. 6, Att. B, Gravel 2012 Rpt. at 214.

513. Second, during the period of 1941 to 1952, a significant proportion of these wastewaters containing oily silt and sludge that overflowed from Callaghan's Bayou would have collected and settled in the Old Silt Pond area because the Old Silt Pond area was immediately south of Callaghan's Bayou, and also because during the wartime period there was an earthen drainage ditch running from Callaghan's Bayou to the middle of the Old Silt Pond area that would have served as a conveyance of some of these contaminated waste materials onto the Old Silt Pond area. Ex. 7, Att. B, Grip 2012 Rebuttal Rpt. at 8; A004047; A004048; A004049; A005050; A004051–A004052.

514. Third, during the period of 1941 to 1945, there would have been a considerably greater amount of oily silt and other waste materials that would have been contained in the wastewaters entering Callaghan's Bayou, and overflowed into the Shallow Fill Zone, including the Old Silt Pond and Rice Paddy Landfarm areas, during heavy rain events and the annual spring flooding than during non-war emergency periods. The U.S. Engineer Office investigated and determined that during WWII the war production operations generated substantially greater waste loads than the pre-war operations, stating: "[t]he enormous operations and rapid expansion of the plant have overloaded the waste disposal system to the extent that pollution of the Mississippi is a daily occurrence," and further stating "[w]ar activity has caused rapid expansion in plant facilities for production with no increase in waste disposal facilities. This has caused, as stated before, daily pollution of the Mississippi River." A000842–A000843. Given the substantially increased waste loads caused by the war production operations, the existing separators were inadequate to handle them, resulting in additional, increased discharges of oily silt and other waste materials to Callaghan's Bayou, and overflowing onto the Shallow Fill Zone and Old Silt Pond and Rice Paddy Landfarm areas during heavy rain events and the annual spring flooding period. A003914.

515. Fourth, much of the contaminated fill materials that comprise the Shallow Fill Zone, including in the Old Silt Pond and Rice Paddy Landfarm areas, was wartime-related oily silt and other waste materials dredged from Callaghan's Bayou and placed or deposited in the

Shallow Fill Zone, including the Old Silt Pond and Rice Paddy Landfarm, during the approximate period of 1941 to 1952. Given the Government's denial of permission to construct the Master Separator during WWII, Callaghan's Bayou was periodically dredged during the war to increase its capacity, and then after the war Callaghan's Bayou was further dredged in order to construct the Master Separator, which required the Bayou to be considerably deepened and widened. According to expert Wayne M. Grip, analysis of historical aerial photographs shows that dredging of Callaghan's Bayou began in 1941 and continued through the 1940s, and in the 1945 aerial photograph there is an expansive area of light-toned material, which suggests that it is oily silt or other waste material, covering much of the western half of the Old Silt Pond area and no apparent vegetation in that area. Ex. 7, Att. B, Grip 2012 Rebuttal Rpt. at 5–8. Given that the dredging occurred during the war or shortly thereafter, the dredged materials necessarily included oily silt and other waste materials generated by the wartime operations that had been conveyed with the wastewaters into Callaghan's Bayou and had collected on the sides and bottom of the Bayou. The dredged materials were placed and spread onto the Shallow Fill Zone to raise its elevation and provide areas for the Old Silt Pond and Rice Paddy Landfarm. A004050; A004035; A004039–A004040; A004054–A004062; Ex. 8, Att. B, J. Johnson 2012 Rpt. at 101; Ex. 6, Att. B, Gravel 2012 Rpt. at 216–17.

516. Fifth, the Old Silt Pond area was further contaminated by periodic disposals of oily wastewater discharges from a diversion chamber/combined sewer overflow device connected to some of the separators during the 1941 to 1955 period. These separators were open and uncovered, and therefore, the purpose of the diversion chamber/combined sewer overflow device was to divert excess rain waters and wastewaters from accumulating in the separators. The device was constructed to discharge the wastewaters directly onto the Old Silt Pond area, where the contaminated wastewaters and waste materials would settle on the ground and leach into the shallow fill materials. A003913; Ex. 7, Att. B, Grip 2012 Rebuttal Rpt. at 8; A004048; A004049; A004050; A004051–004052; A004053.

517. Sixth, a slurry generated by the treatment of oily silt in the silt treatment unit was disposed of in the Old Silt Pond during the period of late 1945 to 1955. Beginning in October 1945, Standard Oil commenced operation of the silt treatment unit to process the oily silt generated by the Baton Rouge Facility's separators and the Chemical Pond, which was an earthen separator in the north part of the Facility used to store oil-laden silty wastewaters generated by the Butadiene and Butyl Rubber Plancors. The processing of the oily silt in the silt treatment unit removed most of the oil, but the resulting slurry did contain a small amount of oil and was transported to the Old Silt Pond for settling and separation of the remaining oil. A003351–A003356; A004063–A004066; A003360; A003366; A003363; A003364; Ex. 6, Att. B, Gravel 2012 Rpt. at 203–04, 215; Ex. 6, Att. B, Grip 2012 Rebuttal Rpt. at 8.

518. Seventh, in regard to the Rice Paddy Landfarm area, according to an historical investigation conducted by a contractor for and on behalf of EPA, "[p]rior to installation of the landfarm, the area beneath the unit was used as a landfill." A003999. EPA's contractor also determined that the Rice Paddy Landfarm area had been "used as a landfill since the early years of the refinery," "and the landfilled wastes included "sludges and miscellaneous wastes." A003999. The EPA's contractors' findings strongly suggest that the Rice Paddy Landfarm area, including that part of the Shallow Fill Zone, was used for the disposal of sludges and miscellaneous wastes generated by the Baton Rouge Facility during the period of 1941 to 1955.

519. Eighth, an area immediately adjacent to the Rice Paddy Landfarm area was used for the disposal of wastewaters collected and temporarily stored in the Impoundment Basin in the southern part of the Baton Rouge Facility during the period of 1941 to 1955. The Impoundment Basin was a large earthen basin located in the south part of the Baton Rouge Facility that was used to store and treat wastewaters generated by the process units and tankage areas in the south part of the Facility. The Impoundment Basin was outfitted with a large, concrete discharge pipe that carried the wastewaters to a connected sewer line, and the sewer line subsequently discharged these wastewaters into an area immediately adjacent to the southern half of the Rice Paddy Landfarm area. A003933; A004067; A003913. Analysis of historical aerial photographs during the late 1930s to the 1950s show the discharge of liquid materials from the Impoundment Basin to the location of the discharge pipe to the south of the Rice Paddy Landfarm, and also shows how the liquids flowed over and inundated the low-lying southern half of the Rice Paddy Landfarm area. Ex. 7, Att. B, Grip 2012 Rebuttal Rpt. at 10; A004047–A004048; A004049; A004051–A004052; A004053; A004068; A004069; A004070.

520. Ninth, the Federal nexus to the Shallow Fill Zone, Old Silt Pond, the Rice Paddy Landfarm, and related contamination is based on virtually all of the wartime operations at the Baton Rouge Facility. The Baton Rouge refinery generated wastewaters that were processed in the separators and discharged into Callaghan's Bayou or the Impoundment Basin during the wartime period, and the refinery manufactured not only avgas and other war products, but also manufactured various, necessary raw materials for the Butyl Rubber Plancor, Butadiene Conversion Plancor, and Avgas Blending Components Plancor. The Hydrogenation Plancor and the Butadiene Conversion Plancor generated wastewaters that were processed in the separators and discharged into Callaghan's Bayou during their periods of operation. The Butadiene Plancor generated certain wastes, including slop oil waste and oil emulsion waste, that were treated and processed in the refinery waste processing system, and the Butyl Rubber Plancor generated slop oil waste and polymer wastes that were treated and processed in the refinery waste processing system. A002002; A002006–A002007; A002009–A002021; A002022–A002026; A001295–A001304; A001687–A001690; A001703–A001720; A001906; A002562; A002565–A002566; A004072.

521. Tenth, the Shallow Fill Zone, Old Silt Pond, and Rice Paddy Landfarm areas were used for the processing, placement, and disposal of some of the wastes and wastewaters generated by the wartime operations during the period of 1941 to 1955, and therefore, subsequent response activities regarding the historical waste and contamination at the Shallow Fill Zone, Old Silt Pond, and Rice Paddy Landfarm areas are attributable in part to the wastes and wastewaters generated by the wartime operations during the period of 1941 to 1955. Ex. 6, Att. B, Gravel 2012 Rpt. at 211–18; Ex. 12, Pisani Decl. *See* PF ¶¶ 510–20.

522. Eleventh, due to the underlying contaminated fill materials at both the Old Silt Pond and Rice Paddy Landfarm waste units, the Louisiana Department of Environmental Quality required Exxon to modify the nature of the cleanup work at both waste units to address the underlying contaminated fill materials and wastes, greatly increasing the response costs. *See* Ex. 12, Pisani Decl.; PF ¶¶ 741–60.

523. API Oil/Water Separators (SWMUs 19a to 19l) are various oil/water separators that are either located on the western or northwestern part of the Baton Rouge Facility. *See* Figure 2, Baton Rouge Map.

524. There is a Federal nexus to the API Oil/Water Separators and related contamination that have been the subject of Exxon response actions. The API Oil/Water Separators (SWMUs 19a to 19l) consist of the following twelve separators: (a) four Storm Separators (SWMUs 19a to 19d), (b) six wastewater separators—Old Main Separators and New Main Separators (SWMUs 19e to 19j), and (c) two other wastewater separators in the Knox Field Area of the Baton Rouge Facility—Knox Field Separators (SWMUs 19k and 19l). The Storm Separators received runoff from parts of the Facility process areas and the waste processing areas, the Old Main and New Main Separators received process wastewaters from much of the Facility, and the Knox Field Area separators received oily wastewater from the Knox Field tanks, and all of these separators have been in operation since approximately 1909. The API Oil/Water Separators were used for the processing of wastewaters and stormwaters generated by the wartime operations during the period of 1941 to 1955, and therefore, subsequent response activities regarding the historical waste and contamination at the API Oil/Water Separators being conducted by Exxon are attributable in part to the wastewaters and stormwaters generated by the wartime operations during the period of 1941 to 1955. A004001; A004004; Ex. 6, Att. B, Gravel 2012 Rpt. at 221.

525. Propane Storage Area Landfill (SWMU 28) is a former unlined landfill that was located on the south central part of the Baton Rouge Facility. *See* Figure 2, Baton Rouge Map. After the landfill ceased to operate, it was covered in concrete and part of a propane storage unit was constructed at that location. A004078.

526. There is a Federal nexus to the Propane Storage Area Landfill and related contamination that have been the subject of Exxon response actions. The Propane Storage Area Landfill was used for the disposal of acid sludge and other wastes, and operated during the period of approximately 1910s to the early 1950s. It was used for the disposal of acid sludge and other wastes generated by the wartime operations during the period of 1941 to the early 1950s, and therefore, subsequent response activities regarding the historical waste and contamination at the Propane Storage Area Landfill being conducted by Exxon are attributable in part to the wastewaters and stormwaters generated by the wartime operations during the period of 1941 to the early 1950s. A004014; A004085; Ex. 6, Att. B, Gravel 2012 Rpt. at 221.

527. Butyl Rubber Landfill (SWMU 29) is a former earthen waste disposal area that was located mostly in the Shallow Fill Zone area on the western part of the Baton Rouge Facility adjacent to the Mississippi River. *See* Figure 2, Baton Rouge Map. The Butyl Rubber Landfill was used for the disposal of off-specification butyl rubber generated by the Butyl Rubber Plancor beginning in 1943, and the landfill ceased operations in the early 1960s.

528. There is a Federal nexus to the Butyl Rubber Landfill and related contamination that have been the subject of Exxon response actions. It was used for the disposal of butyl rubber waste generated by the Butyl Rubber Plancor during the period of 1943 to 1955, and therefore, subsequent response activities regarding the historical waste and contamination at the Butyl Rubber Landfill being conducted by Exxon are attributable in part to the wastes generated

the wartime operations during the period of 1943 to 1955. A004015; A004080–A004082; Ex. 6, Att. B, Gravel 2012 Rpt. at 222-23.

529. North Batture Landfill & Burning Pit (SWMU 33) is a former earthen waste processing and disposal area that was located on the western part of the Baton Rouge Facility. *See* Figure 2, Baton Rouge Map. The North Batture Landfill & Burning Pit was used for the burning or disposal of process wastes such as tank bottoms, rubber waste generated by the Butyl Rubber Plancor, filter clays and other wastes, and the waste unit operated during the period of approximately 1909 to 1969.

530. There is a Federal nexus to the North Batture Landfill & Burning Pit and related contamination that have been the subject of Exxon response actions. It was used for the burning and disposal of wastes generated by the wartime operations during the period of 1941 to 1955, and therefore, subsequent response activities regarding the historical waste and contamination at the North Batture Landfill & Burning Pit being conducted by Exxon are attributable in part to the wastes generated by the wartime operations during the period of 1941 to 1955. A004088; A004099; A004019; Ex. 6, Att. B, Gravel 2012 Rpt. at 222.

531. According to cost causation expert Paul Ficca, the "root cause" of the oily wastes released at Baton Rouge during WWII was the Government's mandate to maximize the production of avgas and other war products. Ex. 3, Att. B, Ficca 2016 Rpt., Attachment 4A at 57–86.

VII. Exxon's Response Actions Concerning These Waste Units and Areas of Contamination

A. Baytown Site

1. Separators 3M and 10

532. The sludges at Separators 3M and 10 were classified as "K051" listed hazardous wastes, A003631; as such, these sludges were hazardous substances under the applicable CERCLA statutory and regulatory definitions. 42 U.S.C. § 9601(14) (defining "hazardous substance" as "any hazardous waste ... listed pursuant to section 3001 of the Solid Waste Disposal Act"); 40 C.F.R. § 302.4(a), Table 302.4 (designating "K051" listed wastes as "hazardous substances"). EPA has indicated that K051 wastes (also known as API separator sludges from the petroleum refining industry) are known to contain hazardous substances such as benzene, toluene, lead and chromium, among others. 40 C.F.R. §§ 268.40; 302.4.

533. The Texas Water Commission ("TWC") determined that releases of hazardous substances from Separator 10 had contaminated the underlying soils. A003649–A003672; A004105–A004107. In addition, Texas regulators found that hazardous constituents related to Separator 3M were detected in groundwater underlying that unit, indicating that there were actual releases of hazardous substances from Separator 3M. A004105 ("[t]he preliminary sampling events of the facility's ground-water assessment plan have indicated that hazardous constituents, reasonably expected to be derived from the wastes contained in [Separator 3M] have been detected in the ground water").

534. Sampling of the sludges from Separators 3M and 10 detected hazardous substances at concentrations that posed urgent actual and/or potential threats to human health or the environment. For example, September 1984 sampling for these sludges showed benzene at a concentration of 110 milligrams per kilogram ("mg/kg") and toluene at 510 mg/kg. A004111–A004526.[21] Exxon informed Texas state regulators that these concentrations were also representative of the composition of the sludges at Separator 10. A004111–A004526.

535. The sludge and some of the soils in this unit were largely at the surface, and the hazardous substances in Separator 3M or the surrounding or underlying soils posed a serious threat to the environment. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 35. The hazardous substances in Separator 10 or in the underlying soils also posed a serious threat to the environment, and the sludge and some of the soils were largely at the surface, posing a serious threat to at least the environment." Ex. 4, Att. C, S. Johnson 2016 Rpt. at 41. Exxon's response actions for Separators 3M and 10 were necessary responses to the releases and/or threats of release of hazardous substances and threats to human health and the environment.

536. The State of Texas set forth two options for the response action for Separators 3M and 10, and provided oversight of Exxon's performance of the response action. A004627–A004634; A003616–A003704; A004108–A004110; A004107; A004535; A004536. Through this oversight, the State of Texas reviewed, commented on, and ultimately approved of all response activities conducted by Exxon for Separators 3M and 10. A004108–A004110; A004107; A004535; A004536.

537. TWC required Exxon to conduct a "clean closure" of Separator 3M. A004108-A004110. Clean closure meant that any soils containing any hazardous substances or other contamination indicator parameters above background concentration levels had to be excavated and properly disposed of by Exxon. A004110; A004105–A004107.[22] Under clean closure, TWC would not allow even de minimis quantities of waste to remain in the unit and required that excavation must occur until clean soil conditions were encountered. A004110; A004105–A004107.

538. The 1982 National Oil and Hazardous Substances Contingency Plan ("NCP") was in effect during the relevant time period applicable to the response actions for Separators 3M and 10. Ex. 13, 1982 NCP; Ex. 14, 1985 NCP (specifying effective date for 1985 NCP of Feb. 18, 1986). The response action for the South Half of Separator 3M was selected in September 1984 and conducted in early to mid-1985 before the 1985 NCP took effect on February 18, 1986. A004105–A004107; A004106–A004110; A004537–A004538; *see also* Ex. 13, 1982 NCP; Ex. 14, 1985 NCP (specifying effective date for 1985 NCP of Feb. 18, 1986).

---

[21] The current EPA risk-based soil screening level for benzene is 0.0026 mg/kg, and is based on the 0.005 milligrams per liter ("mg/L") federal maximum contaminant level for benzene.

[22] The specific hazardous substances listed as the contamination indicator parameters in the partial closure plan and closure plan are also some of the specific hazardous substances listed on the Skinner's List, which is a list of common refinery operations-related hazardous substances developed by EPA in the 1980s. *See* Memorandum dated Apr. 3, 1984 from John Skinner, Director, EPA Office of Solid Waste, to Hazardous Waste Permit Branch Chiefs, Regions I-X, Attachment I, *Appendix VIII Hazardous Constituents Suspected to be Present in Refinery Wastes* (available at https://yosemite.epa.gov/osw/rcra.nsf/0c994248c239947e85256d090071175f/E6B5034257BD9FC08525670F006BBEE3/$file/12439.pdf).

TWC approved the closure plan (and specified modifications to it) covering the North Half of Separator 3M and Separator 10 on September 25, 1985, which again was before the effective date of the 1985 NCP. A004105–A004107.

539. Exxon performed the following response activities with respect to both the South Half and the North Half of Separator 3M. First, Exxon prepared a partial closure plan for the first phase involving the South Half that included an historical assessment and site inspection/investigation of the waste unit, and an evaluation of alternative cleanup options and cost analysis, and set forth the proposed cleanup action. A004532; A004534, A003673–A003691. Second, Exxon conducted removal activities for both portions of Separator 3M; the company conducted periodic sampling and analysis of the surrounding and underlying soils at Separator 3M during the removal activities to determine when all soils exhibiting certain contaminant levels above background levels had been removed. A004537–A004538; A004639–A004642; A004643–A004649. Third, Exxon prepared and submitted a cleanup/closure report regarding the South Half to the TWC and a similar report regarding the North Half to the TWC, A004537–A004538, A004643–004647, A006550–A006552, A004553–A004556, and the appropriate State of Texas environmental agency accepted Exxon's certification of the conduct of the response actions for both portions of Separator 3M. A004535.

540. TWC required Exxon to conduct a "clean closure" of Separator 10. A003649–A003672; A004105–A004107; A004557–A004558. In conducting this response action, Exxon conducted the following activities. First, Exxon prepared a closure plan that included an historical assessment and site inspection/investigation of the waste unit, and an evaluation of alternative cleanup options and cost analysis and proposed cleanup action. A003649–A003672. Second, Exxon conducted removal activities at this unit; the company conducted periodic sampling and analysis of the underlying soils during these activities to determine when all soils exhibiting certain contaminant levels above background levels had been removed. A004559; A004560–A004568. As part of these activities, Exxon was required to remove all sludge and excavated and disposed of all contaminated soils until the periodic sampling and analysis of the soils showed the remaining soils exhibited only background levels of various indicator hazardous substances on the Skinner List for common refinery hazardous substances, such as, for example, chromium, lead, nickel, benzene and toluene. A004105–A004107. Third, Exxon prepared and submitted a cleanup/closure report to the TWC, A004560–A004568, A004569–A004570. and the TWC accepted Exxon's certification of the conduct of the response action. A004557–A004558.

541. Exxon's response actions for Separator 3M and 10 were intended to address the actual and potential releases of hazardous substances from these units, and involved the excavation and removal of highly contaminated soils at or near the surface. A003676; A003651 (Separator 3M and 10 closures were intended, among other things, "to control, minimize, or eliminate, to the extent necessary to protect human health and the environment, any post-closure escape of hazardous waste, hazardous waste constituents, leachate, contaminated rainfall, or waste decomposition products to the ground or surface waters or atmosphere").

542. Under Section 300.67(c)(4) of the 1982 NCP, one of the factors used for determining that a removal action is appropriate is whether there exist highly contaminated soils

largely at or near the surface that pose a serious threat to public health or the environment. Ex. 13, 1982 NCP, 47 Fed. Reg. at 31,216.

543. Section 300.65(b)(4) of the 1982 NCP provides that "[c]ontrolling the source of release" is an appropriate type of removal action. Ex. 13, 1982 NCP, 47 Fed. Reg. at 31,214. Exxon's response actions for Separators 3M and 10 specifically included activities to control the sources of releases. For example, Exxon excavated sludge from the South Half of Separator 3M and substantial amounts of contaminated soils surrounding and below the South Half, and then disposed of this sludge and contaminated soils at the South Landfarm during the period of late 1984 to early 1985. A004532; A004534; A004108–A004110; A004539–A004542; A004537–A004538. Exxon excavated sludge from the North Half of Separator 3M and substantial amounts of contaminated soils surrounding and below the North Half, and then disposed of this sludge and contaminated soils at the South Landfarm in mid-1986. A003673–A003691; A004105–A004107; A004571–A004573; A004550–A004532; A004553–A004556. The response action for Separator 10 consisted primarily of the removal by excavation of residual sludge in the waste unit, and contaminated soils underlying the unit, for disposal at the South Landfarm during the six-month period of March to August 1986. A003649–A003672; A004105–A004107; A004557–A004558.

544. Each phase of Exxon's response actions for Separators 3M and 10 was conducted in approximately six to eight months. A004539–A004542; A004571–A004573; A004543–A004549.

545. Exxon's response actions for Separators 3M and 10 were not intended to be the permanent, final remedy for these units. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 34, 40. These response actions were interim actions that addressed only one part of the release or threatened release of hazardous substances from these Separators; the State of Texas subsequently required Exxon to conduct additional interim measures at and near these areas. For example, the State of Texas required Exxon to conduct a RCRA Facility Investigation ("RFI") of twenty-two SWMUs, including SWMU 70 which included Separators 3M, A003569–A003587, and to conduct groundwater assessments, monitoring and cleanup of groundwater contamination at and in the vicinity of Separators 3M and 10 in which one of the sources of the groundwater contaminants was Separator 3M. A004677.

546. The final, permanent remedy for Separators 3M and 10 will not be selected until Exxon has completed the Facility Operations Area ("FOA") process for the Baytown Refinery. Pursuant to Subchapter G of the Texas Risk Reduction Program, 30 TAC Section 350, entitled "Establishing a Facility Operations Area," a FOA may be established at a qualified, operational industrial facility to address in a site-wide holistic approach multiple sources of constituents of concern ("COCs") within the operational plant. 30 TAC §§ 350.131–350.135. A FOA is based on guidance issued by the State of Texas and can be used to implement environmental response actions for certain industrial facilities such as refineries and chemical plants. A004592–A004659; Ex. 11, Gagnon Decl.; Ex. 10, Paredes Decl.

547. The FOA process has five steps: (a) Step 1—the submission of documentation to TCEQ that the facility meets the FOA qualifying criteria, and TCEQ's confirmation that the facility qualifies; (b) Step 2—the company's preparation and submission of a FOA assessment

report, including information regarding the proposed FOA boundaries, the comprehensive site conceptual model, and the nature and extent of the contamination and associated risks within the proposed FOA boundaries, as well as any off-site historical contamination outside the proposed FOA boundary that originated from the facility at issue; (c) Step 3—the company's preparation and submission of a proposed monitoring and corrective action program, and TCEQ approval of it; (d) Step 4—submission of a proposed FOA application, and TCEQ approval of it; and (e) Step 5—TCEQ's issuance of a modification of the RCRA order setting forth the FOA. A004592–A004659; Ex. 11, Gagnon Decl.

548. Exxon commenced the FOA application process for the Baytown Facility in the early 2000s for the purpose of obtaining separate FOAs for the Baytown Refinery and for the Baytown Chemical Plant. Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 67; *see, e.g.*, A004660–A004667; A004668–A004708. Consistent with TCEQ's FOA requirements, the boundary of the FOAs that are being established at the Baytown Facility encompasses only industrial areas. A004745–A004771; A004772–A004784. Completion of the FOA process will result in the final, permanent remedy for Separators 3M and 10 and other portions of the Baytown Facility for the remaining future period of time that the Refinery and Chemical Plant remain operational. Ex. 11, Gagnon Decl.; Ex. 10, Paredes Decl.

549. An expert witness for the Government, Alborz Wozniak, has stated that Exxon's response actions for Separator 3M and Separator 10 "were performed in a manner generally consistent with the applicable technical steps in the 1982 NCP regulations." Ex. 18, Wozniak 2017 Rpt. at 78, 80. Mr. Wozniak also stated that the 1982 NCP did not specify any requirements for public participation or consideration of applicable and relevant or appropriate requirements ("ARARs"). *E.g.*, Ex. 18, Wozniak 2017 Rpt. at 80.

550. TWC and Exxon conducted public participation activities for the Separator 3M and 10 response actions in accordance with applicable provisions of the Texas closure and post-closure requirements. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 35, 37, 41–42. For example, the partial closure plan for Separator 3M stated that "submission of written comments by the public (a newspaper notice will be given by TDWR) will be allowed" and further noted that the partial closure plan was available for review at the Baytown Refinery. A004527–A004534. Similarly, the closure plan for Separator 10 indicated that it was prepared in accordance with the applicable Texas state requirements that called for a public notice and comment process for the plan, and the plan indicated that it was available for review at the Baytown Refinery. A004629. The Separator 10 closure plan also identified several Exxon staff persons at Baytown who could be contacted about the plan, A004534, and TWC approved the plan, which can only be done after the public participation activities are completed. A004105–A004107.

551. The State of Texas provided detailed oversight during the course of Exxon's response actions for Separators 3M and 10, and reviewed, commented on and ultimately approved these actions. Expert Stephen Johnson has stated that the State of Texas' "active involvement in overseeing the work" for these units "was sufficient to address the public's interest." Ex. 4, Att. C, S. Johnson 2016 Rpt. at 31, 38.

552. Expert Stephen Johnson determined that the response actions for Separators 3M and 10 were required activities and that Exxon had a clear reason and sound basis for these

responses. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 23–24. He therefore determined that these response actions were required, reasonable, and appropriate. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 23–24.

553. Expert Stephen Johnson also examined the extent and nature of Exxon's processes for planning and budgeting, analyzing alternatives, developing scopes of work, contracting, requiring change orders, establishing invoice requirements, reviewing invoices, checking costs against budgets, and revising budgets, to assess whether the costs of the Separator 3M and 10 response actions were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 16–22, 25. Expert Johnson determined that the costs for the cleanup of Separator 3M and Separator 10 were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 25.

554. Expert Stephen Johnson opined that Exxon's response actions for Separators 3M and 10 were necessary response actions, were properly characterized as "removal actions" within the meaning of the relevant NCP, and were performed consistent with the NCP (or at least in substantial compliance with the NCP). Ex. 4, Att. C, S. Johnson 2016 Rpt. at 30–42. Expert Johnson further has opined that the Separator 3M and Separator 10 removal actions resulted in a CERCLA-quality cleanup or are in the process of doing so. Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 31–37.

2. South Landfarm

555. The wastes located at the South Landfarm showed hazardous substance concentrations that posed urgent actual and/or potential threats to human health and the environment. For example, sampling performed in September and October 1984 showed toluene at a concentration of 9,600 mg/kg, benzene at 510 mg/kg, naphthalene at 1,300 mg/kg, chromium at 170 mg/kg, lead at 10 mg/kg, and mercury at 0.36 mg/kg. A010299–A010309. The South Landfarm also was a hazardous waste disposal site containing substantial amounts of K051 listed wastes buried deep in the subsurface soils, and therefore, the State of Texas determined that the public and/or the environment was at risk from exposure to hazardous substances absent the performance of the TWC-approved removal action. A003624–A003648; A004105–A004107.

556. The hazardous substances in the landfarm or the underlying landfill necessarily resulted in actual or potential releases of hazardous substances to the soils and possibly the groundwater, and therefore, posed a serious threat to at least the environment. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 47. Exxon's South Landfarm response action was a necessary response to the releases and/or threats of releases of hazardous substances and threats to human health and the environment.

557. The cleanup activities performed for the South Landfarm were "designed to ensure that all hazardous wastes present in the [South Landfarm] will be contained to the extent necessary to protect human health and the environment." A003627. The South Landfarm was cleaned up as part of an integrated cleanup process involving Separators 3M and 10. A003620; A003624; A003632, A003650–A003672; A003673–A003691. Consequently, the closure of the South Landfarm had to be planned and implemented in the same near-term time frame as the closure of the other units, and Exxon's response action for the South Landfarm was directed to

address the release and/or potential threat of release of hazardous substances at and near the South Landfarm, and threats to human health and the environment. A004105–A004107; A003616–A003704.

558. The 1982 NCP was in effect during the relevant time period for the South Landfarm response action. Ex. 13, 1982 NCP; Ex. 14, 1985 NCP (specifying effective date for 1985 NCP of Feb. 18, 1986). The response action for the South Landfarm was approved by the TWC on September 25, 1985, A004105–A004107, which was while the 1982 NCP was in effect. Ex. 13, 1982 NCP; Ex. 14, 1985 NCP (specifying effective date for 1985 NCP of Feb. 18, 1986).

559. The South Landfarm response action consisted primarily of the following Texas-required activities. First, under TWC's oversight, Exxon prepared a closure plan that included an historical assessment and site inspection/investigation of the waste unit, an evaluation of alternative cleanup options and cost analysis, and a proposed response action, A003624–A003647; this closure plan addressed not only the South Landfarm but also Separators 3M and 10 as well, under which wastes excavated from Separators 3M and 10 were disposed of at the South Landfarm. Second, after TWC approved the proposed closure with modifications, A004105–A004107, Exxon arranged for the construction of a levee around part of the waste unit to ensure that any periodic, localized flooding would not wash away or carry any of the contaminated materials to adjacent areas. A003627–A003633; A004981; A004982–A004983. Third, Exxon allowed for biodegradation of some of the hazardous waste in the unit. A003627–A003633; A004981; A004982–A004983. Fourth, Exxon installed a clay cap on the unit, and the primary component of the clay cap was a four-foot clay layer that minimized the possibility of precipitation coming in contact with the waste. A004986; A004993–A004995; A003630. Fifth, Exxon covered the clay cap with a top soil cover and grass that protected the clay cap and further reduced the possibility of rainwater infiltration. A004986–A004990; A004993–A004995; A003624–A003633. Sixth, Exxon engineered this final cover to be integrated with the refinery's dike system to allow effective drainage of rainwater and protection from erosion. A004987; *see also* A003627–A003633. Seventh, Exxon prepared and submitted a cleanup/closure report, which summarized the prior response activities and included an engineering certification report regarding the clay cap, to the TWC. A003624–A003648; A004105–A004107; A004990; A004982–A004983. Eighth, after TWC accepted Exxon's certification of the conduct of the response action, A004982–A004983, Exxon commenced post-closure care of the unit and long-term groundwater monitoring. A004996–A005007.

560. In 1988, Exxon submitted a "revised closure plan" for approval by the TWC; this proposal was a one-page letter that set forth the following two revisions to Exxon's original January 1985 proposed cleanup/closure plan, which TWC had approved in September 1985: (1) TWC's own revisions to the original closure plan that were set forth in TWC's September 1985 letter; and (2) Exxon's request for a 3:1 maximum slope, rather than the 4:1 maximum slope required by the TWC in its September 1985 letter, on the outer side of the dike to be constructed. A005008–A005034; A005035–A005037; A004993–A004995; A005038–A005040.[23] This revised plan did not constitute a significant modification to the selected

---

23 In short, the removal action conducted by Exxon was approved by the TWC in 1985 as memorialized in its September 25, 1985 letter. A004105–A004107.

removal action as it did not change the nature of the removal action, but rather it was only a minor design change in one of the components of the removal action. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 48 n.131.

561. Under Section 300.67(c)(4) of the 1982 NCP, one of the factors used for determining that a removal action is appropriate is whether there exist highly contaminated soils largely at or near the surface that pose a serious threat to public health or the environment. Ex. 13, 1982 NCP, 47 Fed. Reg. at 31,216. Exxon's response action for the South Landfarm was intended to address the actual and potential releases of hazardous substances from these units, and involved the excavation and removal of highly contaminated soils at or near the surface.[24] Based on these factors, according to expert Stephen Johnson "the South Landfarm was being addressed as a removal action." A005041–A005046.

562. The closure plan for the South Landfarm indicated that it was prepared in accordance with the applicable Texas requirements, and the plan indicated that it was available at the Baytown Refinery. A003620; A003626. The plan also identified several Exxon staff persons at Baytown who could be contacted about the plan, and TWC approved the plan, A004105–A004107, which can only be done after the public participation activities are completed. TAC Section 335.212(d) (1984).

563. The closure of the South Landfarm was an interim response to abate or minimize the threat of a release or potential release of hazardous substances to human health and the environment at multiple units, recognizing that additional work would be needed at some of the units that comprised the integrated closure. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 45. For example, the South Landfarm response action was part of an integrated effort to meet the State of Texas' requirements for a number of waste units that posed environmental threats to human health and the environment, including Separator 3M, Separator 10, and the South Landfarm; Exxon prepared a single closure plan for these units, and waste excavated from Separators 3M and 10 was disposed of at the South Landfarm. Given the threat posed, the State of Texas required Exxon to conduct the response action described above at the South Landfarm. A003624–A003648; A004105–A004107.

564. The response action for the South Landfarm was not intended to be a permanent, final remedy. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 46. Completion of the FOA process will result in the final, permanent remedy for the South Landfarm and other portions of the Baytown Facility for the remaining future period of time that the Refinery and Chemical Plant remain operational. Ex. 11, Gagnon Decl.; Ex. 10, Paredes Decl. Pursuant to Subchapter G of the Texas Risk Reduction Program, 30 TAC Section 350, entitled "Establishing a Facility Operations Area," a FOA may be established at a qualified operational industrial facility to address in a site-wide holistic approach multiple sources of COCs within the operational facility. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 46; Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 10.

---

[24] *See, e.g.*, A005041–A005046 (Separator 3M and 10 closures were intended, among other things, "to control, minimize, or eliminate, to the extent necessary to protect human health and the environment, any post-closure escape of hazardous waste, hazardous waste constituents, leachate, contaminated rainfall, or waste decomposition products to the ground or surface waters or atmosphere").

565. It is quite likely that TWC and Exxon conducted public participation activities before TWC's approval of the South Landfarm closure plan because the State's closure and post-closure requirements mandated such public participation activities, the closure plan indicated that it was prepared in accordance with those requirements, and the plan indicated that the plan was available at the Baytown Refinery. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 47; A003620; A003624–A003648; TAC Section 335.212(d) (1984). The plan also identified several Exxon staff persons at Baytown who could be contacted about the plan, A003620, A003626, and TWC approved the plan. A004105–A004107.

566. The State of Texas provided detailed oversight during the course of Exxon's response actions for the South Landfarm, and reviewed, commented on and ultimately approved these actions. Expert Stephen Johnson has stated that the State of Texas' "active involvement in overseeing the work at this unit was sufficient to address the public's interest." Ex. 4, Att. C, S. Johnson 2016 Rpt. at 44.

567. Expert Stephen Johnson determined that the South Landfarm response action involved required activities and that Exxon had a clear reason and sound basis for this response. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 32–33. He therefore determined that this response was required, reasonable, and appropriate. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 32–33.

568. Expert Stephen Johnson also examined the extent and nature of Exxon's processes for planning and budgeting, analyzing alternatives, developing scopes of work, contracting, requiring change orders, establishing invoice requirements, reviewing invoices, checking costs against budgets, and revising budgets, to assess whether the costs of the South Landfarm response action were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 16–22, 33–34. Expert Johnson determined that the costs for the cleanup of the South Landfarm were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 33–34.

569. Exxon's response action for the South Landfarm was a necessary response, was properly characterized as a "removal action" within the meaning of the relevant NCP, and was performed consistent with the NCP (or at least in substantial compliance with the NCP). Ex. 4, Att. C, S. Johnson 2016 Rpt. at 42–50. Based on these considerations, expert Stephen Johnson further has opined that the South Landfarm removal action resulted in a CERCLA-quality cleanup or is in the process of doing so. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 50; Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 31–37.

3. Upper Outfall Canal, Lower Outfall Canal and Velasco Street Ditch

570. The UOC and LOC contained high concentrations of benzene that caused the sludge to be categorized as "D018" characteristic hazardous waste. A005050.[25] In addition, the TNRCC reported that the UOC and the VSD also were used to manage "F037" listed hazardous waste (consisting of "petroleum refinery primary oil/water/solids separation sludge" as specified under 40 C.F.R. § 261.31(a)). A005051–A005052. These three units also contained elevated concentrations of toluene, ethylbenzene, xylene, nickel, arsenic, lead, and chromium. A005066–A005067.

[25] The "TC limit" for benzene is 0.5 milligrams per liter ("mg/L"). 40 C.F.R. § 261.24(b), Table 1 ("D018" hazardous wastes include those containing benzene at concentrations greater than 0.5 mg/L).

571. At the time the UOC, LOC, and VSD were being closed, there existed "an actual or potential release of hazardous substances that posed a threat to human health and the environment" with respect to each of the three units. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 54. The TNRCC specifically found, for example, that releases of hazardous substances from the UOC were a source of groundwater contamination at that area of the Baytown Facility. A003727.

572. Samples collected from the UOC and LOC groundwater monitoring systems in 1993 showed statistically significant increases in the concentrations of total organic halides and certain other contaminants in wells downgradient of these units. Phase-separated hydrocarbons were also detected in certain wells. These site conditions presented urgent threats that warranted corrective response actions from Exxon. A005253; A005254–A005263.

573. In response to these detections, Exxon implemented soil and groundwater quality assessments for both the UOC and LOC to evaluate potential sources of these hazardous substances. Groundwater sampling performed in August 1995 showed a statistically significant increase in a groundwater monitoring well associated with the UOC (MW-UOC2), with 0.0150 mg/L of benzene detected above the 0.002 mg/L designated background concentration for benzene, A005264; this concentration was also greater than the federal drinking water standard for benzene of 0.005 mg/L. 40 C.F.R. § 141.61(a). As a result, the UOC, LOC, and VSD were a source of actual or potential releases of hazardous substances to the underlying soils and groundwater. Exxon's response actions for the UOC, LOC, and VSD were necessary responses to the releases and/or threats of releases of hazardous substances and threats to human health and the environment.

574. In the early 1990s, the State of Texas required Exxon to retrofit the waste units by installation of liners and other technical modifications, conduct a cleanup and closure of the units, or conduct a cleanup and delay-of-closure of the units. A005271. After consultation between the TWC and Exxon, TWC required Exxon to remove all contaminated liquids and sludge from all of the waste units, in conjunction with the delay-of-closure. A005272–A005274; A005275–A005277. Under the delay-of-closure, Exxon was required by Texas to "have all hazardous sludges and hazardous liquids removed[.]" A005275.

575. The response actions for the UOC, LOC, and VSD did not address potential groundwater contamination underlying the units, and in fact, groundwater monitoring was subsequently conducted at these units and identified the UOC as a source of groundwater contamination necessitating interim groundwater corrective action at WMA-1. A003727. Exxon's cleanup activities for the UOC, LOC, and VSD were interim actions that addressed only the contaminated sludge in these units, which was a potential source of contamination to the underlying groundwater, by the removal and disposal of the sludge. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 53 n.155, 54.

576. The response actions for the UOC, LOC, and VSD were not intended to be a permanent, final remedy. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 54–55. Completion of the FOA process will result in the final, permanent remedy for the UOC, LOC, and VSD and other portions of the Baytown Facility for the remaining future period of time that the Refinery and Chemical Plant remain operational. Ex. 11, Gagnon Decl.; Ex. 10, Paredes Decl.

577. Exxon's response actions for the UOC, LOC, and VSD were all performed after April 9, 1990 when the 1990 NCP became effective. *See* U.S. Environmental Protection Agency, National Oil and Hazardous Substances Pollution Contingency Plan, Final Rule, 55 Fed. Reg. 8,666 (Mar. 8, 1990) ("1990 NCP") (specifying effective date for the 1990 NCP of April 9, 1990).

578. Sections 300.415(b)(2)(iv) and (viii) of the 1990 NCP states that a removal action is warranted if site conditions include:(a) high levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface; and/or (b) situations or factors that may pose threats to public health or the welfare of the United States or the environment. 40 C.F.R. § 300.415(b)(2)(iv), (viii). Exxon's response actions for the UOC, LOC, and VSD were intended to address high levels of hazardous substances in soils largely at or near the surface and other situations posing threats to public health or welfare or the environment.

579. In addition, Sections 300.415(e)(6) and (8) of the 1990 NCP state that appropriate removal actions include (a) excavation, consolidation, or removal of highly contaminated soils from drainage or other areas - where such actions will reduce the spread of, or direct contact with the contamination; and (b) containment, treatment, disposal, or incineration of hazardous materials - where needed to reduce the likelihood of human, animal, or food chain exposure. 40 C.F.R. §§ 300.415(e)(6), (8).

580. Exxon's response actions for the UOC, LOC, and VSD involved primarily the following types of Texas-required activities. First, Exxon conducted historical and environmental investigations that determined that the UOC, LOC, and VSD had received historical hazardous wastewaters and contained hazardous wastes, which are hazardous substances. A005278–A005283. Second, on February 12, 1991 and September 21, 1991, Exxon initiated the cleanup and delay-of-closure for the UOC, LOC, and VSD (and several other waste units) in which TWC would require the company to have removed all contaminated liquids and sludge from these units. A005284–A005285; A005286–A005289; A005272–A005274; A005278–A005283. Third, Exxon installed a groundwater monitoring network around the waste units and began conducting regular groundwater monitoring. A005290–A005294; A005251–A005253; A005047–A005050. Fourth, Exxon conducted environmental investigations to characterize the nature and estimated amounts of contaminated sludge in the waste units, A005055, A005295-A005339; these activities included the development of both field sampling plans and quality assurance project plans. A005340–A005525; A005251; A005059–A005060; A005295–A005339. Fifth, given that removal of all contaminated sludge was a required component of the response action, through its contractor Exxon conducted a cost analysis of the proposed work to conduct the excavation, transportation and off-site disposal of the contaminated sludge. A005423; A005427–A005526; A005528; A005529–A005532. Exxon also conducted through the selected contractor an engineering evaluation, including bench-scale treatability studies, of the alternative technologies for the dewatering of the excavated sludge before transport and disposal. A005366–A005373. Sixth, Exxon excavated the contaminated liquids and sludge from the units and then transported and disposed of the contaminated sludge at an off-site, licensed, RCRA-approved disposal facility. A005295–A005339; A005340–

A005525; A005529–A005532; A005533–A005557; A005558; A005559; A005560–A005562; A005563–A005566; A005567.[26]

581. Exxon required its environmental contractors conducting the UOC, LOC, and VSD response activities to comply with the company's established and written occupational safety and health program and requirements, and furthermore, the environmental contractor also complied, and required its subcontractors to comply, with its own established and written occupational safety and health plan and procedures. A005354–A005364; A005570–A005591. Exxon also prepared and maintained necessary documentation regarding the nature of the response action. A005278–A005283; A005286–A005289; A005272–A005274; A005050; A005595–A005605; A005606–A005609; A005055; A005295–A005339; A005340–A005525; A005526–A005528; A005529–A005532; A005533–A005557; A005558; A005559; A005560–A005560; A005563–A005566; A005567.

582. The response actions for the UOC, LOC, and VSD included evaluation of alternative technological approaches and selection of the best available technological approach, A005423–A005427, A005526–A005528, A005529–A005532, A005592–A005594, and all other requirements were satisfied. A005286–A005289; A005592–A005594; A006951; A005340–A005525; A010325. In addition, Exxon identified applicable and relevant and appropriate requirements ("ARARs") for its cleanup activities and complied with such requirements, as confirmed by TWC and TNRCC's oversight of the response action and issuance of the delay-of-closure permit modification. A005286–A005289; A005592–A005594; A006951; A005340–A005525; A010325.

583. An expert witness for the Government, Alborz Wozniak, has stated that based on his review of the available records "Exxon's RCRA actions at the UOC and LOC generally followed the technical steps required under NCP for investigation, alternatives evaluation, and remedial implementation," and that in his opinion "Exxon's actions at the UOC/LOC were performed in a manner generally consistent with the applicable technical steps in the 1990 NCP regulations." Ex. 18, Wozniak 2017 Rpt. at 81. Mr. Wozniak also stated that "Exxon's actions related to the UOC/LOC included appropriate evaluation of regulatory standards and action limits and were consistent with the NCP requirement for consideration of ARARs." Ex. 18, Wozniak 2017 Rpt. at 82.

584. With the oversight and approval of the TWC, Exxon issued a public notice of the proposed response action, which was sent directly to persons and organizations on the refinery's mailing list and also published notice to the public in the local newspaper. A005595–A005605. Exxon also provided a 60-day public comment period—to which no public comments were received during the 60-day period or thereafter, and held a public meeting. A005595–A005605.

585. The State of Texas oversaw Exxon's performance of the response actions for the UOC, LOC, and VSD. Through this oversight, the State of Texas reviewed, commented on, and ultimately approved of all work done by Exxon. A005592–A005594; A004042–A004046;

[26] Subsequently in 2008 Exxon applied for and TNRCC approved a risk-based clean closure of the VSD that did not involve any additional removal activities due to the removal of all contaminated sludge during the earlier delay-of-closure. A005284–A005285; A005286–A005289; A005272–A005274; A005278–A005283; A005568.

A005275–A005277; A005595–A005605; A005610–A005611; A005612–A005618; A005558; A005559; A005560–A005562; A010325.

586. Expert Johnson determined that these response actions were required activities and that Exxon had a clear reason and sound basis for these responses. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 25–28. He therefore determined that these response actions were required, reasonable, and appropriate. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 27–28.

587. Expert Stephen Johnson also examined the extent and nature of Exxon's processes for planning and budgeting, analyzing alternatives, developing scopes of work, contracting, requiring change orders, establishing invoice requirements, reviewing invoices, checking costs against budgets, and revising budgets, to assess whether the costs of the UOC, LOC, and VSD response actions were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 16–22, 28. Expert Johnson determined that the costs for the cleanup of the UOC, LOC, and VSD were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 28.

588. Exxon's response actions for the UOC, LOC, and VSD were necessary response actions, were properly characterized as "removal actions" within the meaning of the relevant NCP, and were performed consistent with the NCP (or at least in substantial compliance with the NCP). Ex. 4, Att. C, S. Johnson 2016 Rpt. at 42–50. Based on these considerations, expert Stephen Johnson further has opined that UOC, LOC, and VSD removal actions resulted in a CERCLA-quality cleanup or are in the process of doing so. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 50; Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 31–37.

4. Mitchell Point (SWMU 60)

589. Sampling results for surface and subsurface soils at SWMU 60 showed that critical protective concentration levels ("PCLs") had been exceeded in the soils and groundwater at or in the vicinity of SWMU 60 for a number of hazardous substances, including, for example, arsenic, lead, benzene, benzo(a)anthracene, benzo(a)pyrene, dibenzo(a,h)anthracene, ethylbenzene, 2,4-dimethlyphenol, 4-methylphenol, 1-methylnaphthalene, toluene, xylenes, and total petroleum hydrocarbons. A005619–A005659. Soil concentrations identified at SWMU 60 were found to exceed Texas state risk levels, and posed an unacceptable risk or threat to industrial workers at this area which warranted an urgent response from Exxon. Ex. 11, Gagnon Decl; A005660–A005662.

590. The TNRCC required that Exxon's response actions be sufficient to address the soil or groundwater PCL exceedance zone ("PCLE"). A005665–A005678; A005682. In addition, potential exposure pathways for the wastes located at SWMU 60 included contaminant migration via surface water runoff and/or groundwater to Mitchell and Scott's Bays and the Houston Ship Channel, A005636, A005644, A005646, which are located immediately adjacent to SWMU 60 along its western and southern edges. A005636. Exxon's response action was directed at these threats and were required by the State of Texas to address these threats. A005683–A005738; A005639; A005663–A005882; A005740–A005741. Exxon's SWMU 60 response action was a necessary response to the releases and/or threats of releases of hazardous substances and threats to human health and the environment.

591. TNRCC issued a March 1995 Agreed Order to Exxon, AA002754–A002801, under which SWMU 60 was listed as a SWMU for which an RFI was required. As part of the RFI workplan, SWMU 60 was designated as a "Perimeter SWMU" with a "higher priority" due to its location on or outside the boundaries of the operational areas of the refinery, but still part of the overall refinery complex. A005619–A005659; Ex. 11, Gagnon Decl.

592. The response activities at SWMU 60 were conducted after April 9, 1990, when the 1990 NCP took effect. 1990 NCP, 55 Fed. Reg. at 8,666.

593. Under Sections 300.415(b)(2)(iv) and (viii) of the 1990 NCP, removal actions are warranted to address site conditions where: (a) there exist high levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface; and (b) there are other situations or factors that may pose threats to public health or the welfare of the United States or the environment. 40 C.F.R. §§ 300.415(b)(2)(iv), (viii).

594. In addition, Sections 300.415(e)(4), (6) and (8) of the 1990 NCP provide that appropriate removal actions include (a) the capping of contaminated soils or sludges—where needed to reduce migration of hazardous substances or pollutants or contaminants into soil, groundwater, or air; (b) excavation, consolidation, or removal of highly contaminated soils from drainage or other areas—where such actions will reduce the spread of, or direct contact with the contamination; and (c) containment, treatment, disposal, or incineration of hazardous materials—where needed to reduce the likelihood of human, animal, or food chain exposure. 40 C.F.R. §§ 300.415(e)(4), (6), (8).

595. Exxon's response actions for SWMU 60 consisted primarily of the following Texas-required activities. First, TCEQ's predecessor—TNRCC—identified SWMU 60 as one of the twenty-two SWMUs subject to an RFI, and subsequently SWMU 60 was categorized as a "Perimeter SWMU." A005619–A005659. Second, as required by TCEQ, Exxon conducted a series of additional investigations and assessments of SWMU 60, including an historical uses assessment, soil and groundwater investigations, and a Tier 2 screening level ecological risk assessment for groundwater to surface water pathways. The results of these investigations were reported to TCEQ in "Phase I/II RCRA Facility Investigation Report for Eight Perimeter SWMUs" and the subsequent addendum report. A005616–A005659; A005742–A005753. Third, based on the results of the investigations and risk assessment, and the location of SWMU 60 outside the projected FOA, TCEQ required Exxon to submit a response action plan ("RAP") for the performance of an interim response action in September 2004 earlier than a response action at other SWMUs. Exxon submitted a proposed RAP in February 2005, and responded to various sets of TCEQ comments until TCEQ approved the final response and requested that Exxon submit a Revised RAP in May 2007. A005683–A005738. Fourth, in accordance with the approved Revised RAP, Exxon excavated limited contaminated soils at the SWMU 60 area, installed an engineered soil cover over a 5-acre area of affected soils, implemented ongoing monitored natural attenuation of the groundwater, and implemented institutional controls that were termed a "plume management zone." In July 2011, Exxon submitted a Response Action Completion Report ("RACR") to TCEQ, summarizing the response activities conducted in accordance with the approved Revised RAP. A005663–A005682. TCEQ accepted the RACR in September 2011. Ex. 11, Gagnon Decl.; A005740–A005741.

596. Exxon's response activities for SWMU 60 were interim responses to abate or minimize an actual or potential release of hazardous substances that posed a threat to human health and the environment, given that groundwater contamination below both units was not addressed, but would be subject to ongoing groundwater monitoring and/or monitored natural attenuation. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 89; Ex. 11, Gagnon Decl. Given the threat posed, the "lead agency" TCEQ required Exxon to conduct the required response action for SWMU 60. A005683–A005738; A005739; A005663–A005682; A005740–A005741.

597. The SWMU 60 response action was not intended to be a permanent, final remedy. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 89–90. Rather, TCEQ required Exxon to conduct earlier interim response actions at SWMU 60 prior to implementation of the proposed FOA approach to investigating the Baytown Facility because this SWMU (and the other Perimeter SWMUs) were outside the proposed FOA boundary of groundwater monitoring wells. A005616–A005659.

598. Exxon required its environmental contractors performing the response action involving SWMU 60 to comply with Exxon's established and written occupational safety and health program and requirements, and furthermore, the environmental contractors conducting the work also had their own occupational safety and health plans that they complied with. A005774–A005921; Ex. 11, Gagnon Decl. Exxon also prepared and maintained necessary documentation regarding the nature of the response action. A005616–A005659; A005742–A005755; A005683–A005738; A005739; A005663–A005682; A005740–A005741.

599. Exxon identified the ARARs for the SWMU 60 response action and complied with such requirements, as confirmed by the TCEQ's review and approval of the RAPs, oversight of the response actions, and review and acceptance of the RACR for SWMU 60. A005683–A005738; A005739; A005663–A005682; A005740–A005741. According to an expert for the Government, Alborz Wozniak, "Exxon's actions related to the SWMU 60 . . . included appropriate evaluation of regulatory standards and action limits and were consistent with the NCP requirement for consideration of ARARs." Ex. 18, Wozniak 2017 Rpt. at 90.

600. The TCEQ and Exxon worked together to evaluate alternative approaches for addressing SWMU 60. For example, Exxon proposed the use of physical controls (i.e., fencing) and institutional controls (i.e., deed restrictions) as a more cost-effective approach than an alternative that included removal and disposal of contaminated soils and installation of a soil cover; however, as the "lead agency" TCEQ concluded that of these alternative approaches the physical and institutional controls would not sufficiently prevent possible exposure to the hazardous substances of concern and, therefore, that an alternative that included the removal and disposal of contaminated soils and installation of a soil cover was preferable. Ex. 11, Gagnon Decl. The Agency ultimately selected and required this response action after the public participation activities were completed. Ex. 11, Gagnon Decl.

601. The TCEQ and Exxon conducted public participation activities, which included a public notice of the proposed response action in the local newspaper, and a 45-day public comment period. No public comments were received and therefore TCEQ determined that a public hearing was not necessary. A005952–A005953, A005954–A005965, A005966–

A005971, A005739; Ex. 11, Gagnon Decl. After completion of these public participation activities, TCEQ approved the Revised RAP in February 2009. A005739.

602. The State of Texas approved these response actions for SWMU 60, required Exxon to conduct them, and oversaw Exxon's performance of these response actions. A005619–A005659; A005742–A005755; A005683–A005738; A005739; A005663–A005682; A005740–A005741; Ex. 11, Gagnon Decl.

603. Expert Stephen Johnson determined that the SWMU 60 response action involved required activities and that Exxon had a clear reason and sound basis for this response. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 5–6, 8–15. He therefore determined that this response was required, reasonable, and appropriate. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 5–6, 8–15.

604. Expert Stephen Johnson also examined the extent and nature of Exxon's processes for planning and budgeting, analyzing alternatives, developing scopes of work, contracting, requiring change orders, establishing invoice requirements, reviewing invoices, checking costs against budgets, and revising budgets, to assess whether the costs of the SWMU 60 response action were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22. Expert Johnson determined that the costs for the cleanup of SWMU 60 were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22.

605. Exxon's response action for SWMU 60 was a necessary response, was properly characterized as a "removal action" within the meaning of the relevant NCP, and was performed consistent with the NCP (or at least in substantial compliance with the NCP). Ex. 4, Att. C, S. Johnson 2016 Rpt. at 84–93. Based on these considerations, Expert Stephen Johnson further has opined that the SWMU 60 removal action resulted in a CERCLA-quality cleanup or is in the process of doing so. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 93; Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 31–37.

5. Main Office Building (SWMU 62)

606. Sampling results for surface and subsurface soils at SWMU 62 showed that critical protective concentration levels ("PCLs") had been exceeded in the soils and groundwater at or in the vicinity of SWMU 62 for a number of hazardous substances, including, for example, arsenic, lead, benzene, benzo(a)anthracene, benzo(a)pyrene, dibenzo(a,h)anthracene, ethylbenzene, 2,4-dimethlyphenol, 4-methylphenol, 1-methylnaphthalene, toluene, xylenes, and total petroleum hydrocarbons. A005972–A006058; A006059–A006068. Sampling results for lead in surface and near-surface soils at SWMU 62 were of particular concern, because lead was found in these soils at concentrations of 2,040 mg/kg and 2,410 mg/kg, as well as estimated concentrations of 10,100 mg/kg and 24,900 mg/kg. A006070. These conditions posed an urgent actual or potential threat to human health and the environment that warranted Exxon's response. Ex. 11, Gagnon Decl.

607. The response actions for SWMU 62 therefore had to be sufficient to address the soil or groundwater PCL exceedance zone ("PCLE"). A005982–A005984; A006036–A006047. Potential exposure pathways for the wastes located at SWMU 62 included contaminant migration via surface water runoff and/or groundwater to Goose Creek, A010329, which is

located immediately adjacent to SWMU 62 along its northern edge. A006082, Exxon's response actions were directed at these threats and were required by the State of Texas to address these threats. A005972–A006058; A006039–A006068; A010329 ("Because ExxonMobil was concerned about the potential for migration of COPCs in soil via surface runoff to Goose Creek, interim corrective action was initiated by late 1999 to stabilize and revegetate the exposed areas").

608. Pursuant to the March 1995 Agreed Order, A006146–A006147, the TNRCC required Exxon to conduct an RFI for several SWMUs including SWMU 62. As part of the RFI workplan, SWMU 62 was designated as a "Perimeter SWMU" with a "higher priority" due to its location on or outside the boundaries of the operational areas of the refinery, but still part of the overall refinery complex. A010326–A010329; Ex. 11, Gagnon Decl. TCEQ required Exxon to conduct earlier interim response actions at SWMU 62 prior to implementation of the proposed FOA approach to investigating the Baytown Facility because this SWMU (and the other Perimeter SWMUs) were outside the proposed FOA boundary of groundwater monitoring wells. Exxon's SWMU 62 response action was a necessary response to the releases and/or threats of releases of hazardous substances and threats to human health and the environment.

609. The response activities at SWMU 62 were conducted after April 9, 1990, when the 1990 NCP took effect.

610. Under NCP Sections 300.415(b)(2)(iv) and (viii) of the 1990 NCP, removal actions are warranted to address site conditions where: (a) there exist high levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface; and (b) there are other situations or factors that may pose threats to public health or the welfare of the United States or the environment. 40 C.F.R. § 300.415(b)(2)(iv) & (viii).

611. In addition, Sections 300.415(e)(4), (6) and (8) of the 1990 NCP provide that appropriate removal actions include (a) the capping of contaminated soils or sludges—where needed to reduce migration of hazardous substances or pollutants or contaminants into soil, groundwater, or air; (b) excavation, consolidation, or removal of highly contaminated soils from drainage or other areas—where such actions will reduce the spread of, or direct contact with the contamination; and (c) containment, treatment, disposal, or incineration of hazardous materials—where needed to reduce the likelihood of human, animal, or food chain exposure. 40 C.F.R. § 300.415(e)(4), (6) & (8).

612. Exxon's response actions for SWMU 62 consisted primarily of the following Texas-required activities. First, as required by TCEQ, Exxon conducted a series of additional investigations and assessments of SWMU 62, including an historical uses assessment, soil and groundwater investigations, and an evaluation of the Tier 1 ecological exclusion criteria checklist. The results of these investigations were reported to TCEQ in the "Phase I/II RCRA Facility Investigation Report for Eight Perimeter SWMUs" and the subsequent addendum report. A006087–A006103; A010326–A010329. Second, based on the results of the investigations and risk assessment and the location of SWMU 62 outside the projected FOA, TCEQ required Exxon to submit a RAP for the performance of an interim response action, and Exxon submitted a proposed RAP in April 2011. A005792–A006058. Third, TCEQ provided an initial review of the RAP in July 2011 and April 2012, A005792–A006058, A006059, and

subsequently approved the RAP. Ex. 11, Gagnon Decl. Fourth, in accordance with the approved RAP, Exxon conducted the interim response action that consisted of a shallow soils investigation, removal of certain contaminated shallow soils as necessary, installation of a vegetative cap, cost-effective use of existing pavement over some of the affected soils as an "engineered cover" to control potential exposure to any COCs, and long-term groundwater monitoring. Fifth, Exxon submitted a RACR summarizing the response activities conducted in accordance with the approved RAP, and TCEQ is currently reviewing the RACR. Ex. 11, Gagnon Decl.

613. Exxon's response activities for SWMU 62 were interim responses to abate or minimize an actual or potential release of hazardous substances that posed a threat to human health and the environment, given that groundwater contamination below both units was not addressed, but will be subject to ongoing groundwater monitoring and/or monitored natural attenuation. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 89; Ex. 11, Gagnon Decl. Given the threat posed, the "lead agency" TCEQ required Exxon to conduct the required response action for SWMU 62. A005972–A006058; A006059–A006068.

614. The SWMU 62 response action was not intended to be a permanent, final remedy. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 89–90. TCEQ required Exxon to conduct earlier interim response actions at SWMU 62 prior to implementation of the proposed FOA approach. A010326–A010329

615. Exxon required its environmental contractors performing the response action involving SWMU 62 to comply with Exxon's established and written occupational safety and health program and requirements, and furthermore, the environmental contractors conducting the work also had their own occupational safety and health plans that they complied with. Ex. 11, Gagnon Decl.; A005756–A005951. Exxon also prepared and maintained necessary documentation regarding the nature of the response action. A006087–A006103; A005972–A006058; A006059–A006068.

616. Exxon identified the ARARs for the SWMU 62 response action and complied with such requirements, as confirmed by the TCEQ's review and approval of the RAPs, oversight of the response actions, and review and acceptance of the RACR for SWMU 62. A005972–A006078. According to an expert for the Government, Alborz Wozniak, "Exxon's actions related to the SWMU . . . 62 included appropriate evaluation of regulatory standards and action limits and were consistent with the NCP requirement for consideration of ARARs." Ex. 18, Wozniak 2017 Rpt. at 90.

617. Exxon's evaluation of alternatives for SWMU 62 occurred after TCEQ had required the response action for SWMU 60 to include the removal of contaminated soils and installation of a soil cover, and therefore, Exxon applied the lessons learned from the SWMU 60 alternative selection process. Given the lessons learned, in considering alternative response actions for SWMU 62 Exxon knew then that TCEQ would not approve a response action that involved only physical controls and institutional controls, so Exxon proposed for SWMU 62 a response action similar to what TCEQ required for SWMU 60, A006059–A006068; Ex. 11, Gagnon Decl.; TCEQ subsequently approved this proposed action. A006059–A006068. In addition, Exxon also conducted a cost analysis of the proposed response action that determined

that a significant cost savings could be achieved by use of on-site backfill materials, rather than purchased, off-site backfill materials, and would not result in the response action being any less effective. Ex. 11, Gagnon Decl.

618. Exxon published notice of the opportunity for public comment on the proposed SWMU 62 RAP in the local newspaper and conducted a 45-day public comment period; however, no public comments were received and therefore TCEQ determined that a public meeting was not necessary. A006104–A006110; Ex. 11, Gagnon Decl.

619. The State of Texas approved these response actions for SWMU 62, required Exxon to conduct them, and oversaw Exxon's performance of these response actions. A006069–A006086; A006087–A006103; A005972–A006058; A006059–A006068; Ex. 11, Gagnon Decl.

620. Expert Stephen Johnson determined that the SWMU 62 response action involved required activities and that Exxon had a clear reason and sound basis for this response. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 5–6, 8–15. He therefore determined that this response was required, reasonable, and appropriate. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 5–6, 8–15.

621. Expert Stephen Johnson also examined the extent and nature of Exxon's processes for planning and budgeting, analyzing alternatives, developing scopes of work, contracting, requiring change orders, establishing invoice requirements, reviewing invoices, checking costs against budgets, and revising budgets, to assess whether the costs of the SWMU 62 response action were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22. Expert Johnson determined that the costs for the cleanup of SWMU 62 were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22.

622. Exxon's response action for SWMU 62 was a necessary response, was properly characterized as a "removal action" within the meaning of the relevant NCP, and was performed consistent with the NCP (or at least in substantial compliance with the NCP). Ex. 4, Att. C, S. Johnson 2016 Rpt. at 84–93. Based on these considerations, Expert Stephen Johnson further has opined that the SWMU 62 removal action resulted in a CERCLA-quality cleanup or is in the process of doing so. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 93; Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 31–37.

6. Refinery Plume Areas

623. Groundwater sampling at the Refinery Plume Areas showed hazardous substances at concentrations that posed urgent actual and/or potential threats to human health or the environment. This contamination consisted of phase-separated hydrocarbons and hazardous substances, such as lead, benzene, and 1,2-dichloroethane. A006114–A006117. For example, benzene was detected in groundwater at concentrations of 1.31 mg/L, and 3.20 mg/L in Plume Area 1; and 15.5 mg/L and 42 mg/L in Plume Area 4, all of which were above the RCRA hazardous waste regulatory level of 0.5 mg/L for benzene. A006116–A006117. Significant levels of phase-separated hydrocarbons ("PSH") (including very high concentrations of hazardous substances in the PSH), were detected in several Refinery Plume Area groundwater monitoring wells. A006114–A006115. Exxon's response action for the Refinery Plume Areas

was a necessary response to the releases and/or threats of releases of hazardous substances and threats to human health and the environment.

624. In response to the discovery of groundwater contamination, the TNRCC issued an administrative order to Exxon directing the company to conduct "interim corrective action" with respect to the Refinery Plume Areas, i.e., Plume Areas 1 through 4. A006147.

625. The groundwater contamination identified at the Refinery Plume Areas constituted actual releases of hazardous substances to the groundwater that posed a threat to human health or the environment, warranting a response action.

626. The Refinery Plume Area response action was specifically intended by the State of Texas to be interim in nature, as the TNRCC referred to the required removal of free product and associated corrective action activities for this Area in the March 1995 Agreed Order as "interim corrective actions." A006139; A006193; A006199–A006202.

627. EPA has established in a formal policy statement that the duration, even the lengthy duration, of a response action should not be definitely used to decide whether the response action is a remedial action rather than a removal action, as EPA clarified that removal actions "most certainly can be long-running responses, too, thereby undercutting the probative value of duration, . . . in deciding whether an action is removal rather than remedial in nature." Ex. 15, EPA Removal Guidance at 3. Similarly, the Refinery Plume Area response has been an interim response irrespective of the fact that the removal of the free product has continued for a number of years.

628. The interim corrective action plan for the Refinery Plume Areas acknowledges that the removal of the phase-separated hydrocarbons will be the sole focus of this "initial phase" of the interim corrective action. A006188–A006193; A006199–A006202. The response action for the Refinery Plume Area was not intended to be the permanent, final remedy for this area because it did not address any source area soil contamination that caused the impacts to groundwater.

629. The response action for the Refinery Plume Areas was not intended to be the permanent, final remedy for these areas. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 61–62; Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 52–54. Completion of the FOA process will result in the final, permanent remedy for the Refinery Plume Areas and other portions of the Baytown Facility for the remaining future period of time that the Refinery and Chemical Plant remain operational. Ex. 11, Gagnon Decl.; Ex. 10, Paredes Decl.

630. The response action for the Refinery Plume Areas was performed after April 9, 1990, when the 1990 NCP took effect. 1990 NCP, 55 Fed. Reg. at 8,666.

631. Under Section 300.415(b)(2)(viii) of the 1990 NCP, removal actions are appropriate to address site conditions that involve situations or factors that may pose threats to public health or the welfare of the United States or the environment. 40 C.F.R. § 300.415(b)(2)(viii). In addition, Section 300.415(e)(8) of the 1990 NCP provides that appropriate removal actions include the "containment, treatment, disposal, or incineration of hazardous substances." 40 C.F.R. § 300.415(e)(8).

632. Exxon's response actions for the Refinery Plume Areas consisted primarily of the following Texas-required activities. First, Exxon prepared and submitted a Soil Investigation Work Plan to TNRCC for approval, A006203–A006214, and TNRCC approved the plan. A006215. Second, Exxon prepared and submitted a Groundwater Quality Assessment Plan to TNRCC for approval for the design, installation, operation, and maintenance of a groundwater monitoring system to characterize the nature, extent, degree, and migration rate of contaminants impacting the four plume areas, A006111–A006134, and TNRCC approved the plan. A006216–A006217. The Groundwater Quality Assessment Plan included a sampling and analytical plan, a sampling quality assurance plan, a past activities remedial report, a hydrocarbon source study plan, and a health and safety plan. A006111–A006134. Third, Exxon prepared and submitted an Interim Corrective Action Plan to TNRCC for approval for the design, installation, operation, and maintenance of an interim groundwater contaminant extraction and treatment system for the removal and treatment of PSH contaminants impacting the groundwater in the Refinery Plume Areas, A006183–A006198, A006199–A006202, and TNRCC approved the plan. A006199–A006202; A006223. Fourth, Exxon prepared and submitted a Phase 1 Groundwater Quality Assessment Interim Report to TNRCC. A006224–A006225. Fifth, Exxon prepared and submitted a Phase 1 Soil Investigation Interim Report to TNRCC. A006226–A006241. Sixth, Exxon prepared and submitted a Well Certification Report to TNRCC. A006224–A006225. Seventh, Exxon prepared and submitted a Soil Investigation Phase 2 Report to TNRCC, A006242–A006297, and TNRCC deemed it satisfactory. A006224–A006225. Eighth, Exxon implemented the TNRCC-approved interim corrective action plan, continues to operate the interim corrective action system in accordance with an Operations and Maintenance Plan, A006218–A006223, A006218–A006223, A006234, and submits regular reports to TNRCC, and subsequently TCEQ, regarding both the operation and maintenance of the interim groundwater corrective action system and the results of the semi-annual groundwater monitoring. A006613; A006614–A006640.

633. Exxon required its environmental contractors involved in the response activities for the Refinery Plume Areas to comply with Exxon's established and written occupational safety and health program and requirements, and furthermore, the environmental contractor also complied, and required its subcontractors to comply, with its own established and written occupational safety and health plan and procedures. A005570–A005591; A006641–A006688; A005774–A005921. In fact, the TNRCC's Agreed Order required that the interim corrective action work be conducted in accordance with the federal health and safety regulations and the work was done in accordance with these requirements. A006162. Exxon also prepared and maintained necessary documentation regarding the nature of these response activities. A006203–A006214; A006111–A006134; A006199–A006202; A006226–A006241; A006242–A006297; A006223; A006298–A006599; A006614–A006640.

634. Exxon employed a "feasibility/effectiveness screening process" for the interim groundwater corrective action system used for each Refinery Plume Area by: (a) conducting groundwater assessments and other investigations to fully characterize the nature and extent of the groundwater contamination, (b) conducting regular groundwater monitoring as the system was operated, and (c) evaluating and modifying the system "to improve the effectiveness of the PSH recovery system." A006193; A006199–A006202.

635. Exxon applied to the TNRCC to authorize the treatment of the recovered groundwater from the extraction wells in the wastewater treatment plant at the Baytown Facility, and its permit was amended with the issuance of TNRCC Permit No. 006271 accordingly. A006183–A006198; A006199–A006202; A006693–A006764.[27]

636. Exxon identified ARARs for its cleanup activities and complied with such requirements, as confirmed by the TNRCC's oversight of the Refinery Plume Area response action. A006199–A006202; A006223; A006215; A006224–A006225. For example, the March 1995 Agreed Order specified the groundwater standards for the interim groundwater action required by the State for the Refinery Plume Area, A006150, and Exxon's response action has been seeking to achieve these standards. A006199–A006202; A006223; A006215; A006224–A006225.

637. Prior to implementing the interim corrective action for the Refinery Plume Areas, Exxon conducted public participation activities. Exxon provided public notice through publication of a notice in the local newspaper and an opportunity for the public to comment on the proposal, although no public comments were received. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 65.

638. The State of Texas required Exxon to conduct the response action, and oversaw Exxon's performance of the response action. A006147; A006215; A006224–A006225.

639. Expert Stephen Johnson determined that the Refinery Plume Areas response action involved required activities and that Exxon had a clear reason and sound basis for this response. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 29–32. He therefore determined that this response was required, reasonable, and appropriate. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 29–32.

640. Expert Stephen Johnson also examined the extent and nature of Exxon's processes for planning and budgeting, analyzing alternatives, developing scopes of work, contracting, requiring change orders, establishing invoice requirements, reviewing invoices, checking costs against budgets, and revising budgets, to assess whether the costs of the Refinery Plume Areas 62 response action were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22, 32. Expert Johnson determined that the costs for the cleanup of the Refinery Plume Areas were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22, 32.

641. Exxon's response action for the Refinery Plume Areas was a necessary response, was properly characterized as a "removal action" within the meaning of the relevant NCP, and was performed consistent with the NCP (or at least in substantial compliance with the NCP). Ex. 4, Att. C, S. Johnson 2016 Rpt. at 58–65; Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 46–66. Based on these considerations, expert Johnson further has opined that the Refinery Plume Areas removal action resulted in a CERCLA-quality cleanup or is in the process of doing so. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 65; Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 31–37.

---

[27] Exxon amended the permit so as to allow the discharge of recovered groundwater for both the Refinery Plume Areas interim groundwater corrective action and, as described below, the Tankfarm 3000 Area interim groundwater corrective action.

7. Tankfarm 3000 Area

642. In the early 1990s, Exxon conducted subsurface investigations that identified various hazardous substances, including benzene, toluene, ethyl benzene, xylenes, and total petroleum hydrocarbons, in soil samples and groundwater samples in the Tankfarm 3000 Area. A006770–A006782; A006783–A006798; A006799–A006806.[28] Samples collected during these activities detected hazardous substances at concentrations that posed urgent actual and/or potential threats to human health or the environment. For example, soil samples described in January 1991 and December 1991 reports for this Area detected numerous hazardous substances including benzene at concentrations of 4,300 micrograms per kilogram ("ug/kg") and 6,200 ug/kg; toluene at 100,000 ug/kg, 233,000 ug/kg and 260,000 ug/kg; ethylbenzene at 250,000 ug/kg, 469,000 ug/kg and 1,100,000 ug/kg; and total xylenes at 1,911,000 ug/kg, 4,400,000 ug/kg and 18,000,000 ug/kg. A006765–A006782. A010330–A010334. Groundwater sampling showed benzene at concentrations of 620 micrograms per liter ("ug/L") and 1,600 ug/L, as well as the presence of PSH in several monitoring wells. A006770–A006782. Exxon's response action for Tankfarm 3000 was a necessary response to the releases and/or threats of releases of hazardous substances and threats to human health and the environment.

643. Based on the discovery of this groundwater contamination, in the mid-1990s TNRCC issued an administrative order to Exxon directing the company to conduct various response actions, including additional soil and groundwater investigations, groundwater monitoring, and interim groundwater corrective action of the two groundwater contaminant plumes in the Tankfarm 3000 Area. A006807–A006816.

644. This groundwater contamination represented actual releases of hazardous substances that posed a threat to human health and the environment, and Exxon's response action was directed at these threats and was required to be undertaken by the State of Texas to address these threats. A006807–A006816. When questioned whether the Tankfarm 3000 Area groundwater plume "presents a risk to human health and the environment currently," expert Stephen Johnson testified "yes," and explained that "you have contaminants in the aquifer and groundwater that is migrating, and that's the circumstance that poses a threat that migrates ultimately toward the ship channel." A005044–A005045.

645. The Tankfarm 3000 Area response action was intended as an interim response action, consistent with the State of Texas' July 1995 Agreed Order which required Exxon to conduct the removal of free product at this area. A006807–A006816; A006199–A006202. EPA has established in a formal policy statement that the duration, even the lengthy duration, of a response action should not be definitely used to decide whether the response action is a remedial action rather than a removal action, as EPA clarified that removal actions "most certainly can be long-running responses, too, thereby undercutting the probative value of duration, . . . in deciding whether an action is removal rather than remedial in nature." Ex. 15, EPA Removal Guidance at 3. Similarly, the Tankfarm 3000 Area response has been an interim response irrespective of the fact that the removal of the free product has continued for a number of years.

[28] However, any costs incurred by Exxon to conduct these investigations are not being claimed by Exxon in this CERCLA action.

646. The Tankfarm 3000 Area response action was not intended to be a permanent, final remedy, because it was only intended to extract the phase-separated hydrocarbons in the groundwater at that these areas, and only to contain but not remove the dissolved phase hydrocarbons. A006693–A006764; A006824vA006832; Ex. 4, Att. C, S. Johnson 2016 Rpt. at 69; Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 52–54. Completion of the FOA process will result in the final, permanent remedy for the Tankfarm 3000 Area and other portions of the Baytown Facility for the remaining future period of time that the Refinery and Chemical Plant remain operational. Ex. 11, Gagnon Decl.; Ex. 10, Paredes Decl.

647. Exxon's response action for the Tankfarm 3000 Area was performed after April 9, 1990, when the 1990 NCP took effect. 1990 NCP, 55 Fed. Reg. at 8,666.

648. Section 300.415(b)(2) of the 1990 NCP indicates that a removal action is the appropriate response when site conditions involve (a) high levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface (given that the contaminants have already impacted the groundwater at the Groundwater Contaminant Areas); and/or (b) situations or factors that may pose threats to public health or the welfare of the United States or the environment. 40 C.F.R. §§ 300.415(b)(2)(iv), (viii). In addition, Section 300.415(e)(8) of the 1990 NCP states that appropriate removal actions include the containment, treatment, disposal, or incineration of hazardous materials. 40 C.F.R. § 300.415(e)(8).

649. Exxon's Tankfarm 3000 Area response action consisted primarily of the following Texas-required activities. First, Exxon prepared and submitted a Hydrocarbon Recovery Action Plan ("HRAP") to TNRCC for approval for the design, installation, operation and maintenance of a hydrocarbon recovery system ("HRS") in the Tankfarm 3000 Area. The purpose of the HRS was to recover phase-separated hydrocarbons, contain and control migration of the dissolved phase hydrocarbons and phase-separated hydrocarbons contaminant plumes, and conduct regular groundwater monitoring in the Tankfarm 3000 Area. A006810; A006693–A006764.[29] The HRAP was approved by TNRCC. A006818. Second, Exxon commenced regular groundwater monitoring in accordance with the HRAP and related Sampling and Analysis Plan and continues to conduct such monitoring. A006824–A006832; A006833–A006845. Third, Exxon prepared and submitted a Hydrocarbon Source Investigation Plan ("HSIP") to TNRCC for approval, and its purpose was to identify any ongoing source of the phase-separated hydrocarbon contamination, A006812, A006846, and TNRCC approved the HSIP in 1996. A006846. Fourth, Exxon submitted a Hydrocarbon Source Investigation – Final Report ("HSIFR") to TNRCC that documented the investigation of tanks and lines that may have been potential sources of the groundwater contamination at the Tankfarm 3000 Area and the report concluded that the "main source of the plume is believed to be historic." A006846. TNRCC approved the HSIFR in 1998. A006824–A006832. Fifth, Exxon submitted a Delineation of Hydrocarbons in Soils Report ("DHSR") to TNRCC, the purpose of which was to delineate the vertical and lateral extent of soil contamination, A006814, A006824–A006832, and the agency approved the report. A006824–A006832. Sixth, Exxon conducted a light non-aqueous phase liquid ("LNAPL") recovery efficiency study ("LRES") at the Tankfarm 3000 Area and submitted a report summarizing the study to TNRCC. A006824–A006832. The

[29] The HRAP included a Sampling and Analysis Plan at Appendix B, including a quality assurance/quality control manual, and health and safety plan that fully complied with the federal OSHA requirements. A006699.

purpose of the LRES was to conduct a comparative evaluation of the alternative groundwater extraction systems, particularly with respect to the system and approach that would provide for the optimal rate for recovery of phase-separated hydrocarbons, and any necessary adjustments to improve the system's optimal recovery and overall effectiveness at the removal of the phase-separated hydrocarbons. A006811; A006825–A006826. Based on the results of the LRES, Exxon proposed an LNAPL skimming recovery technology for implementation of the HRS, A006825–A006827, and the TNRCC approved the proposed HRS. A006825–A006826. Seventh, Exxon designed, installed and began operating the HRS for the removal and treatment of the phase-separated hydrocarbons from the groundwater in the Tankfarm 3000 Area, and continues to do so. A006825–A006826.

650. Exxon required its environmental contractors involved in the response activities for Tankfarm 3000 Area to comply with the company's established and written occupational safety and health program and requirements. A006699. Furthermore, the environmental contractor also complied, and required its subcontractors to comply, with its own established and written occupational safety and health plan and procedures. In fact, the HRAP contained a detailed worker health and safety plan that fully complied with the federal OSHA requirements. A006699. Exxon also prepared and maintained necessary documentation regarding the nature of the Tankfarm 3000 Area response action. *See, e.g.*, A006770–A006782; A006783–A006798; A006693–A006764; A006824–A006832; A006846–A006849; A006833–A006845; A010330–A010334.

651. Exxon has complied with all applicable laws in performing the Tankfarm 3000 Area response action. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 13; A010322–A010324.

652. Exxon identified and complied with ARARs for the Tankfarm 3000 Area response action, as confirmed by the TNRCC's oversight of the response action. A006807–A006816; A006824–A006832. For example, the July 1995 Agreed Order specified the groundwater standards for the interim groundwater action required by the State for Tankfarm 3000 Area, A006807–A006816, and Exxon's response action has been seeking to achieve these standards, A006824–A006832.

653. Exxon conducted an LRES that involved a comparative evaluation of the alternative groundwater extraction systems, particularly with respect to the system and approach that would provide for the optimal rate for recovery of phase-separated hydrocarbons, and any necessary adjustments to improve the system's optimal recovery and overall effectiveness at the removal of the phase-separated hydrocarbons. A006811; A006825–A006826. Through the LRES, Exxon evaluated the most feasible and effective alternatives for conducting the removal action. A006811; A006825–A006826.

654. An expert for the Government, Alborz Wozniak, has stated that Exxon's response action for Tank Farm 3000 Area "followed the technical steps required under NCP for investigation, alternative evaluation, and implementation of a remedial action," and he also opined that "Exxon's actions in Tank Farm 3000 Area were performed in a manner generally consistent with the applicable technical steps in the 1990 NCP regulations." Ex. 18, Wozniak 2017 Rpt. at 94.

655. Exxon published a public notice in the local newspaper giving the public an opportunity comment on the proposed Tankfarm 3000 Area response action; this notice was issued in connection with the proposed amendment to Exxon's wastewater treatment permit to allow for treatment of the recovered groundwater from the extraction wells in the wastewater treatment plant at the Baytown Facility. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 72; A010322–A010324.

656. The State of Texas required Exxon to conduct the response action for Tankfarm 3000, and oversaw Exxon's performance of the response action. A006811; A006824–A006832.

657. Expert Stephen Johnson determined that the Tankfarm 3000 Area response action involved required activities and that Exxon had a clear reason and sound basis for this response. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 5–6, 8–15. He therefore determined that this response was required, reasonable, and appropriate. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 5–6, 8–15.

658. Expert Johnson also examined the extent and nature of Exxon's processes for planning and budgeting, analyzing alternatives, developing scopes of work, contracting, requiring change orders, establishing invoice requirements, reviewing invoices, checking costs against budgets, and revising budgets, to assess whether the costs of the Tankfarm 3000 Area response action were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22. Expert Johnson determined that the costs for the cleanup of Tankfarm 3000 Area were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22.

659. Exxon's response action for Tankfarm 3000 Area was a necessary response, was properly characterized as a "removal action" within the meaning of the relevant NCP, and was performed consistent with the NCP (or at least in substantial compliance with the NCP). Ex. 4, Att. C, S. Johnson 2016 Rpt. at 65–72; Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 46–66. Based on these considerations, expert Stephen Johnson further has opined that the Tankfarm 3000 Area removal action resulted in a CERCLA-quality cleanup or is in the process of doing so. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 72; Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 31–37.

8. Waste Management Area 1

660. In the mid-1990s, groundwater monitoring conducted in conjunction with the delay-of-closure of the UOC identified contaminants, such as, for example, benzene, toluene, and LNAPL, in groundwater samples taken from wells in the vicinity of the UOC. A006850; A005264; A006851–A006856; A006857–A006860.

661. Additional groundwater monitoring required by TNRCC confirmed this groundwater contamination resulted from historical releases of hazardous substances from the UOC and Old Separator 3 (i.e., Separator 3M and generally SWMU 70) and Old Separator 12 (i.e., SWMU 71). A004577. Laboratory results for samples collected during these activities identified hazardous substance concentrations that posed urgent actual and/or potential threats to human health or the environment. For example, in August 1995, Exxon's contractor found statistically significant increases in the benzene concentrations detected in two groundwater

monitoring wells near the UOC and LOC, showing average benzene concentrations of 0.0095 mg/L in MW-WOU10 and 0.0150 mg/L in MW-UOC2, and additional statistically significant increases of benzene levels in these same monitoring wells during May 1996. A005264–A005265. Exxon's WMA-1 response action was a necessary response to the releases and/or threats of releases of hazardous substances and threats to human health and the environment.

662. Initially, the State specified that "Exxon must propose a Corrective Action Program . . . to recover the NAPLs" and clean up groundwater to achieve TNRCC-specified groundwater protection standards for this area. A006851–A006856. The TNRCC also subsequently required Exxon to submit an application for proposed interim corrective actions consisting of groundwater monitoring and extraction of groundwater contaminants in the area of the Baytown Facility where the Outfall Canals and SWMUs 70 and 71 were located, which was designated as WMA-1 by the TNRCC. A006850; A005265.

663. The State of Texas specified the urgency of Exxon's response action by requiring Exxon to "initiate the Corrective Action Program immediately upon issuance of" the State's Plan for WMA-1. A004583.

664. The groundwater contamination located at WMA-1 constituted actual releases of hazardous substances to the groundwater that posed urgent actual threats to human health or the environment, warranting a response action. Exxon's response action for WMA-1 was directed at these threats and was required to be undertaken by the State of Texas to address these threats. A004574–A004591; Ex. 4, Att. C, S. Johnson 2016 Rpt. at 75.

665. The WMA-1 response action was not intended to be a permanent, final remedy because it was only intended to extract the LNAPL in the groundwater at WMA-1, but not to address overall groundwater issues at the Baytown Facility. A004574–A004591. Completion of the FOA process will result in the final, permanent remedy for WMA-1 and other portions of the Baytown Facility for the remaining future period of time that the Refinery and Chemical Plant remain operational. Ex. 11, Gagnon Decl.; Ex. 10, Paredes Decl.

666. Exxon's response action for WMA-1 was performed after April 9, 1990, when the 1990 NCP took effect. 1990 NCP, 55 Fed. Reg. at 8,666.

667. Under Sections 300.415(b)(2)(iv) and (viii) of the 1990 NCP, a removal action is warranted when site conditions involve: (a) high levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface; and/or (b) situations or factors that may pose threats to public health or the welfare of the United States or the environment. Section 300.415(e)(8) of the 1990 NCP also states that appropriate removal actions include the containment, treatment, disposal, or incineration of hazardous materials. 40 C.F.R. § 300.415(e)(8).

668. The WMA-1 response action consisted primarily of the following Texas-required activities. First, based on the findings of groundwater contamination in the vicinity of the UOC and other nearby waste units and at TNRCC's direction, Exxon submitted a proposal for response action. A006861–A006864; A006850; A005264–A005265. Second, TNRCC, the "lead agency" and Exxon reviewed and evaluated alternative response actions, A006865,

A006851–A006856, A006866, A006857–A006860; specifically, early in the process of determining the appropriate response action, the "lead agency" TNRCC and Exxon reviewed and evaluated various response actions, such as, for example, groundwater monitoring without a groundwater extraction and recovery system; groundwater monitoring and separate groundwater extraction and recovery systems for the LNAPL groundwater contamination downgradient of the UOC and another system for the groundwater contamination at SWMUs 70 and 71; and groundwater monitoring and one groundwater extraction and recovery system for both the groundwater contamination downgradient of the UOC and at SWMUs 70 and 71 by collectively designating these areas as WMA-1. A006851–A006856; A006857–A006860; A006867–A006870; A005264–A005270. Third, after Exxon revised its proposal pursuant to TNRCC's comments, TNRCC issued a Plan setting forth the proposed groundwater monitoring and interim groundwater corrective action to be conducted in the vicinity of the Outfall Canals and other nearby waste units. A006921; A006850; A005267; A006867–A006870. Fourth, TNRCC published a public notice of the proposed response action, and Exxon conducted the TNRCC-required public participation activities regarding the proposed Plan. A006922–A006932; A006944–A006946; A006947–A006950; A006951; A006952–A006953; A006954–A006957; A006958–A006961; A006962–A006965; A006966–A006971; A006850; A005268; A006859. After no public comments or requests for hearing were received, TNRCC issued a final Plan. A006850; A005268. Fifth, Exxon began to conduct the groundwater monitoring and the extraction and treatment of groundwater contaminated with LNAPLs at WMA-1, and it continues to do so. A004574–A004591; A006972–A006983; A006988–A007003; A007004–A007305.

669. As part of its response action for WMA-1, Exxon required its environmental contractors to comply with Exxon's established and written occupational safety and health program and requirements, and furthermore, the environmental contractor also complied, and required its subcontractors to comply, with its own established and written occupational safety and health plan and procedures. A007456; A009466–A009513; A005774–A005921. Exxon also prepared and maintained necessary documentation regarding the nature of the response action. A004574–A004591; A006984–A007003; A007004–A007305.

670. The Plan for WMA-1 set forth detailed requirements regarding the design, installation and operation of the groundwater extraction and treatment system that both TNRCC and Exxon had worked together to formulate to ensure the system's effectiveness in removing LNAPL from the groundwater contamination impacting WMA-1. A004578–A004590. In addition, the Plan required Exxon to continuously evaluate and improve the performance of the system—to the extent possible—during its operation, through both monitoring of the system and review of the groundwater data compiled during the conduct of the associated groundwater monitoring, as the semi-annual WMA-1 corrective action reports prepared by Exxon and submitted to TNRCC and subsequently TCEQ indicate. A007002; A007024.

671. Exxon complied with applicable requirements for the WMA-1 response action. The TNRCC confirmed that the WMA-1 Plan would authorize the disposal of the recovered groundwater (after treatment) at the Baytown Facility's wastewater treatment facility provided it was in accordance with the applicable requirements for such facility. A006859; A004579–A004580; A006996; A007023. Exxon's subsequent semi-annual reports also confirm that the

recovered groundwater has been properly sent to the Baytown Facility's wastewater treatment system. A006996; A007023.

672. Exxon also identified and complied with ARARs in connection with the WMA-1 response action, as confirmed by the ARARs set forth in the WMA-1 Plan and TNRCC's oversight and approval of this response action. A006850; A005265; A006861–A006864; A006865; A006851–A006856; A006866; A006857–A006860; A006921; A006850; A005267; A006871–A006920. In fact, an expert witness for the Government, Alborz Wozniak, has stated that based on his review of the available records "Exxon's actions related to the WMA-1 included appropriate evaluation of regulatory standards and action limits and were consistent with the NCP requirement for consideration of ARARs." Ex. 18, Wozniak 2017 Rpt. at 92.

673. Exxon conducted a series of historical and environmental investigations regarding the UOC and SWMUs 70 and 71. Exxon also conducted groundwater monitoring at and in the vicinity of the UOC that confirmed that these waste units were the primary sources of the historic releases of hazardous substances that impacted and caused the relevant groundwater contamination at WMA-1. This led to TNRCC's decision that the response action set forth in the Plan was warranted. A007470–A007475; A003469–A003587; A005264–A005270; A005059–A005060; A005295–A005339; A006857–A006860. Exxon developed sampling plans for this work that included both field sampling plans and quality assurance project plans. A004585; A007306–A007469.

674. TNRCC ultimately proposed and selected the alternative of groundwater monitoring and one interim groundwater extraction and recovery system for WMA-1. A006857–A006860; A004574–A004591. In addition, TNRCC required Exxon to conduct a cost analysis to evaluate the specific costs for each component, and the overall cost, of the proposed response action. A007476–A007485.

675. The TNRCC or Exxon conducted the following public participation activities for the WMA-1 response action: (a) the TNRCC issued a public notice regarding the proposed plan; (b) Exxon provided public notice of the proposed plan in the local newspaper, including that the plan and other information and background materials were available for public review at a specific location at the TNRCC, (c) Exxon provided an additional public notice in the form of a radio broadcast regarding the proposed plan via transmission on a local radio station; and (d) after issuance of the public notices via the local newspaper and local radio station, TNRCC and Exxon afforded the public a 45-day public comment period to submit comments or request a hearing. A006922–A006932; A006944–A006946; A006947–A006950; A006951; A006952–A006953; A006954–A006857; A006958–A006961; A006962–A006965; A006966–A006971; A006850; A005268; A006859. No public comments were received and no requests for a hearing regarding the proposed response action were made by the public during the public comment period. A006850.

676. Expert Stephen Johnson determined that the WMA-1 response action involved required activities and that Exxon had a clear reason and sound basis for this response. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 5–6, 8–15, 26–28. He therefore determined that this response was required, reasonable, and appropriate. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 5–6, 8–15, 26–28.

677. Expert Stephen Johnson also examined the extent and nature of Exxon's processes for planning and budgeting, analyzing alternatives, developing scopes of work, contracting, requiring change orders, establishing invoice requirements, reviewing invoices, checking costs against budgets, and revising budgets, to assess whether the costs of the WMA-1 response action were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22, 28. Expert Johnson determined that the costs for the cleanup of WMA-1 were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22, 28.

678. Exxon's response action for WMA-1 was a necessary response, was properly characterized as a "removal action" within the meaning of the relevant NCP, and was performed consistent with the NCP (or at least in substantial compliance with the NCP). Ex. 4, Att. C, S. Johnson 2016 Rpt. at 72–80; Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 46–66. Based on these considerations, expert Stephen Johnson further has opined that the WMA-1 removal action resulted in a CERCLA-quality cleanup or is in the process of doing so. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 80; Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 31–37.

9. RCRA Facility Investigation ("RFI")

679. In March 1995 TNRCC issued an administrative order requiring Exxon to perform an RFI for twenty-two of the SWMUs at the Baytown Facility. A006135–A006182. To comply with TNRCC's order, Exxon prepared an RFI Work Plan and then began conducting the RFI. A007486–A007672; A003469–A003587; A005619–A005659; A007673–A007674; A005742–A005755; A006087–A006103; A007675–A007696; A007697–A007706; A007707–A007719; A007720–A007726. The primary objective of the RFI has been to conduct investigations and assessments of the SWMUs and the soil and groundwater in the vicinity of the SWMUs in order to characterize the nature and extent of the wastes and associated contamination at each SWMU, to assess whether there have been actual or potential releases of contaminants, including hazardous substances, at these SWMUs that posed a threat to human health or the environment, and to determine whether a response action in the form of corrective action is warranted. A007486–A007672; A003469–A003587.

680. Hazardous substances had been disposed of and/or were managed at the twenty-two SWMUs covered by the RFI. For example, the following listed hazardous wastes were documented to have been managed and/or disposed of at SWMU 47 (the "Waste Clay Pile"), SWMU 69 (also known as the "Old Separator Area" and "Separator 2"), SWMU 70 ("Old Separator 3"), SWMU 71 ("Old Separator 12"), SWMU 74 (former "Separator 1"), and SWMUs 72 and 73 (former "Sludge Pits"): F037 (primary oil/water/solids separation sludge); K049 (slop oil emulsion solids); K050 (heat exchanger bundle cleaning sludge); K051 (API separator sludge); K052 (leaded tank bottoms); K169 (crude oil storage tank sediment); and K170 (clarified slurry oil tank sediment and/or filter/separation solids). 40 C.F.R. §§ 261.31, 261.32; A005001–A005007. All of these wastes specified above were designated as and/or contained hazardous substances,[30] and there were actual and/or potential threatened releases of such substances from these SWMUs. A005001–A005007. Exxon's RFI response action was a

30 40 C.F.R. § 302.4(a), Table 302.4 (designating F037, K049, K050, K051, K052, K169 and K170 listed wastes as "hazardous substances").

necessary response to the releases and/or threats of releases of hazardous substances and threats to human health and the environment.

681. The 1990 NCP was in effect during the relevant time period applicable to the RFI Investigation response action. 1990 NCP, 55 Fed. Reg. at 8,666 (specifying effective date for the 1990 NCP of Apr. 9, 1990).

682. The CERCLA statute defines "removal" actions to include actions taken "to monitor, assess, and evaluate the release or threat of release of hazardous substances." 1990 NCP, 55 Fed. Reg. at 8,666 (specifying effective date for the 1990 NCP of Apr. 9, 1990). In addition, according to expert Stephen Johnson, "if what you're ultimately getting to is my view on how - how do you classify investigation work under the removal/remedial distinction, then I think ... that investigation work is considered a removal action where you have to pick one of those two." A005043.

683. The RFI response action followed the NCP process for removal-type investigation activities, because it included a preliminary assessment and/or a site inspection to make an initial appraisal of site conditions at the SWMUs with respect to the RFI. A003531–A003540; A003560–A003564. This response also utilized appropriate sampling plans and quality assurance project plan. A003531–A003540; A003560–A003564; A005774–A005921.

684. Exxon required its environmental contractors performing the RFI activities to comply with the company's established and written occupational safety and health program and requirements, and furthermore, in many cases the environmental contractors conducting the work also had their own occupational safety and health plans that they complied with. A005774–A005921; A003531–A003540; A003560–A003564.

685. Exxon prepared and maintained necessary documentation regarding the nature of the RFI response action. A003469–A003587; A005619–A005659; A006069–A006086; A007673–A007674; A005742–A005755; A006087–A006103; A007675–A007696; A007697–A007706; A007720–A007726.

686. The RFI has been conducted using appropriate sampling plans and quality assurance project plans and related procedures. A003469–A003587; A005619–A005659; A006069–A006086; A007673–A007674; A005742–A005755; A006087–A006103; A007675–A007696; A007697–A007706; A007720–A007726.

687. EPA has established in a formal policy statement that the duration, even the lengthy duration, of a response action should not be definitely used to decide whether the response action is a remedial action rather than a removal action, as EPA clarified that removal actions "most certainly can be long-running responses, too, thereby undercutting the probative value of duration, . . . in deciding whether an action is removal rather than remedial in nature." *See* Ex. 15, EPA Removal Guidance at 3. Similarly, the RFI has been an interim removal-type activity irrespective of the fact that the investigation activities have continued for a number of years.

688. The RFI response action has been conducted under RCRA authorities and the oversight of the TNRCC and/or TCEQ. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 80.

689. Expert Johnson determined that the RFI response action involved required activities and that Exxon had a clear reason and sound basis for this response. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 5–6, 8–15. He therefore determined that this response was required, reasonable, and appropriate. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 5–6, 8–15.

690. Expert Stephen Johnson also examined the extent and nature of Exxon's processes for planning and budgeting, analyzing alternatives, developing scopes of work, contracting, requiring change orders, establishing invoice requirements, reviewing invoices, checking costs against budgets, and revising budgets, to assess whether the costs of the RFI response action were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22. Expert Johnson determined that the costs for the RFI were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22.

691. Exxon's RFI response action was a necessary response, was properly characterized as a "removal action" within the meaning of the relevant NCP, and was performed consistent with the NCP (or at least in substantial compliance with the NCP). Ex. 4, Att. C, S. Johnson 2016 Rpt. at 80–84. Based on these considerations, expert Johnson further has opined that the RFI resulted in a CERCLA-quality cleanup or is in the process of doing so. Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 31–37.

10. Facility Operating Area (FOA) Investigation

692. In the early 2000s, Exxon commenced the FOA application process for both the Baytown Refinery and the Baytown Chemical Plant, separately, for the purpose of obtaining a FOA for each. Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 67; Ex. 10, Paredes Decl.; Ex. 11, Gagnon Decl.

693. The FOA Investigation has been intended to address releases or threatened releases of hazardous substances, among other contaminants, within the proposed FOA boundaries, as well as releases occurring outside the boundary that originated from the Baytown refinery or chemical plant. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 82–83. Exxon's FOA Investigation activities have been a necessary response to the releases and/or threatened releases of hazardous substances at the Baytown Facility.

694. Pursuant to Subchapter G of the Texas Risk Reduction Program, entitled "Establishing a Facility Operations Area," a FOA may be established at a qualified, operational industrial facility to address in a site-wide holistic approach multiple sources of COCs within the operational plant. 30 TAC Section 350; Ex. 11, Gagnon Decl.; Ex. 10, Paredes Decl.

695. Exxon is eligible to obtain a FOA. Consistent with TCEQ's FOA requirements, the boundary of the FOA that is being established at Baytown encompasses only industrial areas. Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 67.

696. The FOA process has five steps: (a) Step 1—the submission of documentation to TCEQ that the facility meets the FOA qualifying criteria, and TCEQ's confirmation that the facility qualifies; (b) Step 2—the company's preparation and submission of a FOA assessment report, including information regarding the proposed FOA boundaries, the comprehensive site conceptual model, and the nature and extent of the contamination and associated risks within

the proposed FOA boundaries, as well as any off-site historical contamination outside the proposed FOA boundary that originated from the facility at issue; (c) Step 3—the company's preparation and submission of a proposed monitoring and corrective action program, and TCEQ approval of it; (d) Step 4—submission of a proposed FOA application, and TCEQ approval of it; and (e) Step 5—TCEQ's issuance of a modification of the RCRA order setting forth the FOA. 30 TAC Section 350; Ex. 11, Gagnon Decl.

697. Exxon conducted an evaluation to determine that it could conduct TCEQ-required future environmental investigations, monitoring, and cleanup activities in a more cost-effective manner under a FOA than absent a FOA. Ex. 11, Gagnon Decl.; Ex. 10, Paredes Decl. Exxon's conduct of the FOA process to date has involved a series of environmental investigations, assessments, and ecological risk assessments in furtherance of and conjunction with the submission of the required FOA reports. In particular, Exxon has conducted FOA-related assessment work, installed groundwater wells around the proposed FOA perimeter boundary for both the refinery and chemical plant, and conducted investigations of nearby surface water bodies, such as near the shoreline adjacent to the refinery at Mitchell Bay, Black Duck Bay and the Houston Ship Channel. These activities were used to (a) determine if there were releases of hazardous substances originating from the Baytown Facility that had impacted the immediately adjacent surface waters and sediments located outside the proposed FOA boundary, and (b) provide the site conceptual model for the proposed FOA. A004660–A004667; A004668–A004708; A007737–A007750; A007727–A007736; A007751–A007820; A007821–A008075; A008076–A008107; A008108–A008114; A004772–A004784; A004745–A004771; Ex. 11, Gagnon Decl. Exxon has now completed its actions for the FOA process for the Baytown refinery, but has not yet completed all steps of the process for the Baytown chemical plant. Ex. 10, Paredes Decl.; Ex. 11, Gagnon Decl.

698. In regard to the FOA for the Baytown refinery, in mid-2016 and at the direction of TCEQ, A008115–A008131, Exxon conducted a series of public participation activities to allow the public to meaningfully review and comment upon the proposed FOA. These public participation activities included: (1) a TCEQ-approved public notice published in both the major local English and Spanish newspaper publications for the Baytown, Texas area, A008132–A008166; (2) a TCEQ-approved radio broadcast of the public notice on a local radio station for Harris County, Texas, A008167, Ex. 10, Paredes Decl., Ex. 11, Gagnon Decl., (3) a mailing of the public notice by TCEQ to all adjacent landowners as determined by TCEQ, Ex. 10, Paredes Decl.; and (4) a public information repository at a local public library during the public comment period that provided for public viewing the FOA Step 4 Application and all prior FOA Step 1 through 3 reports, including for example the Step 2 report summarizing the various response activities being conducted at the Baytown refinery at the time of the report. A008168. The public notice provided a 45-day public comment period in which interested persons could submit written comments, or request a public hearing, regarding the proposed FOA setting forth the proposed site-wide corrective action program and related groundwater monitoring network, which will monitor the effectiveness of the corrective action program for the Baytown refinery. A008115–A008131; A008132–A008166; A004785–A004788. During the public comment period, no public comments were received and no requests for a public hearing were made, and therefore, no public hearing was conducted. Ex. 10, Paredes Decl.; Ex. 11, Gagnon Decl.

699. After the public participation process was completed, in September 2016 TCEQ issued final approval of Exxon's application for the FOA for the Baytown refinery, and this FOA has now been put into effect. A004789; A004790-A004980. The completion of the FOA process for the Baytown refinery provides for the site-wide, final permanent remedy for the Baytown refinery during the remaining operational life of the refinery. Ex. 10, Paredes Decl.; Ex. 11, Gagnon Decl.; A004786.

700. In regard to the FOA for the Baytown chemical plant, the FOA process is currently in Step 4 of the process as Exxon is awaiting TCEQ's comments to the proposed FOA application. Ex. 10, Paredes Decl.; Ex. 11, Gagnon Decl. Once the Corrective Action Order that includes a FOA for the Baytown chemical plant is issued to complete that FOA process, it will have a similar purpose as the site-wide, final permanent remedy for the Baytown chemical plant during the remaining operational life of the chemical plant. Ex. 10, Paredes Decl.; Ex. 11, Gagnon Decl.; A004785–A004788.

701. The 1990 NCP was in effect during the relevant time period applicable to the FOA Investigation response action. 1990 NCP, 55 Fed. Reg. at 8,666 (specifying effective date for the 1990 NCP of Apr. 9, 1990).

702. The CERCLA statute defines "removal" actions to include actions taken "to monitor, assess, and evaluate the release or threat of release of hazardous substances." 42 U.S.C. § 9601(23) (CERCLA definition of "remove" or "removal"). Exxon's FOA Investigation response action has included activities to monitor, assess and evaluate the release and/or potential release of hazardous substances at the Baytown refinery and Baytown chemical plant. A004660–A004667; A004668–A004708. In addition, according to expert Stephen Johnson, "if what you're ultimately getting to is my view on how - how do you classify investigation work under the removal/remedial distinction, then I think ... that investigation work is considered a removal action where you have to pick one of those two." A005043.

703. The FOA Investigation response action followed the NCP process for removal-type investigation activities, because it included a preliminary assessment and/or a site inspection to make an initial appraisal of site conditions within the refinery or chemical plant as a whole with respect to the FOA. A004663–A004665; A004660–A004667; A004668–A004708. This response also utilized appropriate sampling plans and quality assurance project plan. Ex. 11, Gagnon Decl.; A005756–A005951; A004663–A004665; A004665–A004667.

704. Exxon required its environmental contractors performing the FOA Investigation activities to comply with the company's established and written occupational safety and health program and requirements, and furthermore, in many cases the environmental contractors conducting the work also had their own occupational safety and health plans that they complied with. A005756–A005951; A004663–A004665; A004665–A004667; A007727–A007736; Ex. 11, Gagnon Decl.

705. Exxon prepared and maintained necessary documentation regarding the nature of the FOA Investigation response action. A003469–A003587; A005619–A005659; A006069–A006086; A007673–A007674; A005742–A005755; A006087–A006103; A007675–A007696; A007697–A007706; A007720–A007726.

706. The FOA has been conducted using appropriate sampling plans and quality assurance project plans and related procedures. A004660–A004667; A004668–A004708; A007737–A007750; A007727–A007736; A007751–A007820; A007821–A008075; A008076–A008107.

707. Exxon's FOA investigation has included the identification and consideration of ARARs. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 75. In fact, Alborz Wozniak, an expert witness for the Government, has opined that "Exxon's investigations related to the FOA included appropriate evaluation of regulatory standards and action limits and were consistent with the NCP requirement for consideration of ARARs." Ex. 18, Wozniak 2017 Rpt. at 100.

708. EPA has established in a formal policy statement that the duration, even the lengthy duration, of a response action should not be definitely used to decide whether the response action is a remedial action rather than a removal action, as EPA clarified that removal actions "most certainly can be long-running responses, too, thereby undercutting the probative value of duration, . . . in deciding whether an action is removal rather than remedial in nature." *See* Ex. 15, EPA Removal Guidance at 3. Similarly, the FOA has been an interim removal-type activity irrespective of the fact that the investigation activities have continued for a number of years.

709. The FOA Investigation has been conducted under applicable Texas state authorities and the oversight of the TNRCC and/or TCEQ. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 80; Ex. 11, Gagnon Decl.

710. Expert Stephen Johnson determined that the FOA response action involved required activities and that Exxon had a clear reason and sound basis for this response. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 5–6, 8–15. He therefore determined that this response was required, reasonable, and appropriate. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 5–6, 8–15.

711. Expert Stephen Johnson also examined the extent and nature of Exxon's processes for planning and budgeting, analyzing alternatives, developing scopes of work, contracting, requiring change orders, establishing invoice requirements, reviewing invoices, checking costs against budgets, and revising budgets, to assess whether the costs of the FOA response action were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22. Expert Johnson determined that the costs for the FOA were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22.

712. Exxon's FOA response action was a necessary response, was properly characterized as a "removal action" within the meaning of the relevant NCP, and was performed consistent with the NCP (or at least in substantial compliance with the NCP). Ex. 4, Att. C, S. Johnson 2016 Rpt. at 80–84; Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 66–76. Based on these considerations, expert Johnson further has opined that the FOA resulted in a CERCLA-quality cleanup or is in the process of doing so. Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 31–37.

B. Baton Rouge Site

1. Shallow Fill Zone

713. In late 1986, both LDEQ and Exxon conducted subsurface investigations in the Shallow Fill Zone that identified the existence of both free phase hydrocarbons in the subsurface and elevated concentrations of some hazardous constituents, including benzene, in certain groundwater samples. Both investigations were required due to LDEQ's concerns that hazardous waste constituents in the contaminated fill zone materials were either leaching vertically down to the underlying aquifer, or migrating horizontally and discharging into the Mississippi River. Ex. 12, Pisani Decl.; A003890–A003894.

714. The LDEQ stated that its investigation revealed the presence of hazardous waste constituents in the groundwater of the uppermost aquifer at the site, and these investigatory findings were known prior to the agency's issuance of the corrective action order. A008230. "Analytical data characterizing ground water samples taken by the Department from [Exxon's] monitoring wells on September 5, 1986 indicates that all six wells are contaminated with hazardous substances." A008188. Sampling of groundwater from the uppermost aquifer at the Shallow Fill Zone also found benzene, toluene, and xylene impacting the groundwater. Ex. 12, Pisani Decl.; A008191.

715. In late 1987, Exxon's contractor conducted a hydrogeologic investigation of the Shallow Fill Zone that consisted of sampling and analysis of soil and groundwater samples from various soil boring locations and groundwater monitoring wells in the Shallow Fill Zone. Some of the key findings of the investigation are discussed below. *See* PF ¶ 716.

716. The subsurface at the Shallow Fill Zone is generally characterized by the following significant areas or layers (listed in increasing depth): (1) a fill zone ranging in depth from 12 to 25 feet and consisting of clays and silts (i.e., this is the fill containing the contaminated fill waste materials); (2) a perched water table which saturates the lower part of the fill layer; (3) an underlying clay layer or barrier; and (4) the uppermost aquifer. A008225; A008226; A008227.

a. The analysis of samples taken from the soil borings (i.e., fill zone core samples) to construct the monitoring wells exhibited extractable oil and grease concentrations ranging from 330 ppm to 20,100 ppm through the full depth of the fill zone. A008220–A008221; A008228.

b. During well installation and development, free phase hydrocarbons were encountered in pockets on the perched water table in four of the six monitoring wells. A008219; A008228.

c. The groundwater samples taken from three of the four monitoring wells where free phase hydrocarbons were present exhibited elevated levels of one or more hazardous constituents. A008228.

d. Sampling of the groundwater at the Shallow Fill Zone detected hazardous substances at concentrations that posed urgent actual and/or potential threats to human health or the environment. For example, benzene was detected at 25 parts per billion ("ppb") in MW-A, and 90 ppb in MW-E; ethylbenzene at 470 ppb in MW-E, and total xylenes at 125 ppb in MW-A, 400 ppb at MW-E, and 13 ppb at MW-F. A008223; A008224. MW-A was located just west of the Old Silt Pond and just east of the Mississippi River; MW-E and MW-F were located north of the Master Separator area (then known as the Clean Master Separator). A008222. Exxon's Shallow Fill Zone response action was a necessary response to the releases and/or threats of releases of hazardous substances and threats to human health and the environment.

717. In February 1987, the LDEQ issued a Corrective Action Order to Exxon, noting that the agency's and Exxon's recent investigations had discovered the presence of hazardous waste and hazardous waste constituents in the Shallow Fill Zone area. In this Corrective Action Order, the LDEQ required Exxon to immediately submit to the agency within 45 days a "Corrective Action and Monitoring Plan." Ex. 12, Pisani Decl.; A008231.

718. The LDEQ had two primary purposes in requiring Exxon to implement interim activities to address the Shallow Fill Zone: (1) preventing the migration of contamination through the Shallow Fill Zone to potential receptors such as the Mississippi River; and (2) addressing potential on-going sources of free-phase hydrocarbons. Ex. 12, Pisani Decl.; A003899–A003902.

719. Pursuant to the Corrective Action Order and one month later, in March 1987, Exxon submitted a Corrective Action and Monitoring Plan for the Shallow Fill Zone. A008354–A008369. This plan involved the installation of sixteen groundwater monitoring wells in the Shallow Fill Zone along the levee adjacent to the Mississippi River. The monitoring wells were not intended to be used for the sampling of the groundwater in the underlying aquifer, but rather to sample the perched water table (referred to as "shallow fill zone groundwater") above the clay layer, and therefore, were only to be drilled to a depth of approximately 20 feet. A008359; A008362. The plan also involved the recovery of free-phase hydrocarbons floating on the shallow fill zone groundwater table from the wells using a portable oil recovery system known as the Auto-Skimmer. Exxon indicated that "immediate recovery of free-phase hydrocarbons floating on the water column" would begin as soon as the oil recovery units were received. A008363; Ex. 12, Pisani Decl.

720. The response action for the Shallow Fill Zone area was commenced in 1987, after the 1985 NCP took effect on February 18, 1986. A008354–A008369; Ex. 14, 1985 NCP.

721. The Shallow Fill Zone response action was intended as an interim response to the conditions identified in this area, to abate or minimize an actual or potential release of hazardous substances that posed a threat to human health and the environment. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 95.

722. The Shallow Fill Zone response was not intended to be a permanent, final remedy because it was only intended to extract the free-phase hydrocarbons in the groundwater in the Shallow Fill Zone. This response was not intended to address the oily waste-laden fill materials that are the source of the free-phase hydrocarbons or to address the dissolved phase hydrocarbons in the groundwater. A008354–A008369; *see also* Ex. 12, Pisani Decl.

723. Under Sections 300.65(b)(2)(i), (iv) and (viii) of the 1985 NCP, a removal action is the appropriate response when site conditions involve: (a) actual or potential exposure to hazardous substances or pollutants or contaminants by nearby populations, animals, or the food chain; (b) high levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate; and/or (c) other situations or factors that may pose threats to public health or welfare or the environment. Ex. 14, 1985 NCP, 50 Fed. Reg. at 47,971.

724. The Shallow Fill Zone response action consisted primarily of the following LDEQ-required activities. First, Exxon installed and operated a groundwater monitoring system to detect any hazardous wastes (i.e., certain types of hazardous substances) in the groundwater. Second, Exxon prepared and submitted a groundwater assessment plan that also included a related sampling and analysis plan to LDEQ. Third, Exxon submitted to LDEQ a corrective action and monitoring plan, whose purposes were to more adequately define the extent of hydrocarbons within the Shallow Fill Zone, provide for the recovery of free phase hydrocarbons, and monitor groundwater quality. Upon LDEQ's approval of the plan, Exxon installed a number of exploratory/recovery wells at approximately 200-foot intervals along the Mississippi River in the Shallow Fill Zone in order to better define subsurface characteristics and to determine the extent of free-phase hydrocarbons in the Shallow Fill Zone, conducted free-phase hydrocarbon recovery at the new and existing wells, conducted sampling and analysis of the groundwater samples and recovered hydrocarbons, and provided LDEQ with status reports regarding this work and its results. Exxon continues to perform the groundwater monitoring and extraction of free-phase hydrocarbons. A008217–A008228; A008229–A008232; A008186–A008190; A008233–A008276; A008277–A008298; A008302; A008303–A008320; A008321–A008336; A008337–A008347.

725. Exxon conducted its response action for the Shallow Fill Zone area in response to the LDEQ's determination that interim activities were required. The LDEQ reviewed Exxon's preliminary assessment report for the Shallow Fill Zone—titled "Shallow Fill Zone Hydrogeologic Investigation"—and determined that certain removal activities were appropriate. A008217–A008228. The LDEQ's February 1987 Corrective Action Order and Compliance Order requiring these interim activities were issued based on the LDEQ's evaluation of the assessment information provided by Exxon. A008229–A008232; A008186–A008190.

726. Exxon required its environmental contractors involved in the Shallow Fill Zone response activities to comply with the company's established and written occupational safety and health program and requirements, and furthermore, in many cases the environmental contractors conducting the work also had their own occupational safety and health plans that they complied with. A008348–A008353.

727. Exxon prepared and maintained necessary documentation regarding the nature of the Shallow Fill Zone response action. A008348–A008353; A008229–A008232; A008186–

A008190; A008233–A008276; A008277–A008298; A008302; A008303–A008320; A008321–A008336; A008337–A008347.

728. The February 1987 Corrective Action Order and Compliance Order specified the ARARs to be achieved by Exxon with respect to the Shallow Fill Zone response action. A008229–A008232; A008186–A008190. Exxon complied with these ARARs, as confirmed by the LDEQ's approval of Exxon's work plans for this response and the response itself. A008354–A008369; A008302.

729. The Shallow Fill Zone response action has been conducted under applicable Louisiana state authorities and the oversight of the LDEQ. Ex. 12, Pisani Decl.; A008229–A008232; A008186–A008190; A008302; A008370–008277.

730. Expert Stephen Johnson determined that the Shallow Fill Zone response action involved required activities and that Exxon had a clear reason and sound basis for this response. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 5–6, 8–15, 34–36. He therefore determined that this response was required, reasonable, and appropriate. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 5–6, 8–15, 34–36.

731. Expert Johnson also examined the extent and nature of Exxon's processes for planning and budgeting, analyzing alternatives, developing scopes of work, contracting, requiring change orders, establishing invoice requirements, reviewing invoices, checking costs against budgets, and revising budgets, to assess whether the costs of the Shallow Fill Zone response action were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22, 36–37. Expert Johnson determined that the costs for the Shallow Fill Zone response action were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22, 36–37.

732. Exxon's Shallow Fill Zone response action was a necessary response, was properly characterized as a "removal action" within the meaning of the relevant NCP, and was performed consistent with the NCP (or at least in substantial compliance with the NCP). Ex. 4, Att. C, S. Johnson 2016 Rpt. at 94–99. Based on these considerations, expert Johnson further has opined that the Shallow Fill Zone response action resulted in a CERCLA-quality cleanup or is in the process of doing so. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 99; Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 31–37.

2. Old Silt Pond

733. In the late 1980s, LDEQ and Exxon determined that the Old Silt Pond contained substantial quantities of sludge that qualified as RCRA listed hazardous wastes, specifically API Separator Sludge (K051), Slop Oil Emulsion Solids (K049), Dissolved Air Flotation Float (K048), and Heat Exchanger Bundle Cleaning Sludge (K050). Ex. 12, Pisani Decl.; A008381; A008389.[31]

734. Sampling results for environmental conditions at the Old Silt Pond detected hazardous substances at concentrations that posed urgent actual and/or potential threats to

[31] The Closure Plan indicated that the unit contained over 5 million cubic yards of sludge that was approximately 20 feet deep. A008390.

human health or the environment. For example, a waste characteristic analysis of the sludge at the Old Silt Pond found benzene at 3.4 ppm and toluene at 8.3 ppm. Various metals and other hazardous substances were also found in the Old Silt Pond wastes. A008389–A008391.

735. The LDEQ considered the Old Silt Pond area and the Shallow Fill Zone to be "interrelated," A008404-A008410, because the wastes at the Old Silt Pond were a source of actual and potential hazardous substance releases to the underlying Shallow Fill Zone and groundwater. Ex. 12, Pisani Decl.; A008404vA008410; A008310. Exxon's Old Silt Pond response action was a necessary response to the releases and/or threats of releases of hazardous substances and threats to human health and the environment.

736. One of the purposes of Exxon's response action for the Old Silt Pond was to "eliminate[] -- to the extent necessary to protect human health and the environment -- post-closure escape of hazardous waste, hazardous waste constituents, leachate, contaminated runoff, and waste decomposition products to the ground water, surface water or atmosphere." A008402; Ex. 12, Pisani Decl.

737. The response action for the Old Silt Pond area was approved by the LDEQ in January 1989, A008411, A008412, after the 1985 NCP took effect on February 18, 1986, Ex. 14, 1985 NCP, but before the 1990 NCP became effective on April 9, 1990. 1990 NCP, 55 Fed. Reg. at 8,666.

738. The Old Silt Pond response action was intended as an interim response to the conditions identified in this area, to abate or minimize an actual or potential release of hazardous substances that posed a threat to human health and the environment. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 102.

739. The Old Silt Pond response activities were not intended to be a permanent, final remedy because they were intended only to prevent the migration of contamination into the environment. The Old Silt Pond overlies and contributes, or potentially contributes contamination to, the Shallow Fill Zone and the response action for the Old Silt Pond is one component of the overall Shallow Fill Zone response. This response action was intended to address only one source of contamination to the Shallow Fill Zone and groundwater receptors; it did not address other potential sources, such as, for example, the oily fill materials in the Shallow Fill Zone or dissolved phase hydrocarbons in the groundwater. A008381; A008389; A008411; A008412.

740. Under Sections 300.65(b)(2)(i), (iv), and (viii) of the 1985 NCP, a removal action is the appropriate response when site conditions involve: (a) actual or potential exposure to hazardous substances or pollutants or contaminants by nearby populations, animals, or the food chain; (b) high levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate; and/or (c) other situations or factors that may pose threats to public health or welfare or the environment. Ex. 14, 1985 NCP, 50 Fed. Reg. at 47,971.

741. The Old Silt Pond response action consisted primarily of the following LDEQ-required activities. First, Exxon evaluated various cleanup alternatives for the Old Silt Pond,

including cost analysis, culminating in the submission of a report titled "Closure and Post-Closure Plans for Old Silt Pond" to LDEQ in June 1988. A008378–A008403. In the report, Exxon proposed a cleanup involving in-situ stabilization of the existing sludge and contaminated fill materials in the Old Silt Pond and then installation of a RCRA cap over the waste unit. A008401. LDEQ approved the proposed response action on January 12, 1989. A008503; A008412. When Exxon began to implement the response action, initial attempts to solidify and stabilize the sludge and contaminated fill materials by in-situ methods proved infeasible, and therefore, with LDEQ's concurrence, Exxon submitted a modified closure plan in January 1991, proposing ex-situ solidification of the sludge and contaminated materials, re-deposition of the solidified materials into the Old Silt Pond, and then installation of a RCRA cap. A008431–A008432. LDEQ approved the modified closure plan on June 14, 1991. A008439. In performing the response action, LDEQ required Exxon to extend the depth of the excavation of contaminated materials for the purpose of the ex-situ solidification through the underlying contaminated fill materials to the point of the sludge/native soil interface (i.e., the native soil was beneath the Shallow Fill Zone contaminated fill materials), which greatly increased the costs of this response action. Ex. 12, Pisani Decl.; A008439. Exxon performed the response action in accordance with the modified closure plan and submitted a closure certification report to LDEQ in November 1993. A008433–A008447. As the "lead agency," LDEQ accepted Exxon's closure certification on January 19, 1995. A008448. Exxon continues to conduct post-closure care, which primarily consists of operation and maintenance of the RCRA cap. A008449–A008456.

742. Exxon conducted its response action for the Old Silt Pond area in response to the LDEQ's determination that interim activities were required. The LDEQ reviewed a preliminary assessment—the "RFA/VSI" regarding the Old Silt Pond and the Rice Paddy Landfarm, A008457–A008466, a site investigation of the Shallow Fill Zone—titled "Shallow Fill Zone Hydrogeologic Investigation," A008217–A008228, and other site conditions to determine that a removal action was appropriate. These reports informed LDEQ that the Old Silt Pond contained hazardous substances but lacked a liner system and other environmentally-protective technical requirements, that the Old Silt Pond was an actual or potential source of contamination to the underlying Shallow Fill Zone and groundwater, and therefore, LDEQ determined that a closure/removal action was appropriate, and then required Exxon to promptly implement certain component activities at the Old Silt Pond. A008378–A008403; A008411; A008412.

743. Exxon required its environmental contractors involved in the Old Silt Pond response activities to comply with the company's established and written occupational safety and health program and requirements, and furthermore, in many cases the environmental contractors conducting the work also had their own occupational safety and health plans that they complied with. A008348–A008353.

744. Exxon prepared and maintained necessary documentation regarding the nature of the Old Silt Pond response activities. A008411; A008412; A008378–A008403; A008431–A008432; A008433–A008447; A008448; A008413–A008418; A008467–A008468; A008469–A008470; A008471–A008478.

745. Exxon identified and complied with ARARs for the Old Silt Pond response activities, as confirmed by LDEQ's oversight of these response activities and approval of closure certification. A008378–A008403; A008411; A008412; A008431–A008432; A008433–A008447; A008448; A008413–A008418; A008467–A008468; A008469–A008470; A008471–A008478.

746. An expert witness for the Government, Alborz Wozniak, has stated that based on his review of the available records "Exxon's actions at the OSP [i.e., Old Silt Pond] were generally consistent with the framework established by the NCP," and that "it is my opinion that Exxon's actions at the OSP were performed in a manner generally consistent with the applicable technical steps in the 1985 NCP regulations." Ex. 18, Wozniak 2017 Rpt. at 105–06. Mr. Wozniak also stated that "Exxon's actions related to the OSP ... included appropriate evaluation of action limits for the time and therefore were consistent with the NCP requirement for consideration of ARARs." Ex. 18, Wozniak 2017 Rpt. at 106.

747. In late 1988, the LDEQ provided public notice and the opportunity for public comments regarding the proposed 1988 Closure and Post-Closure Plans for the Old Silt Pond, and LDEQ received no public comments. A008478; A008400–A008481; A008412. In late 1990, the LDEQ also provided public notice and the opportunity for public comments (and comments by EPA) regarding the proposed modified closure plan for the Old Silt Pond, A008421–A008422, and Exxon conducted a public meeting. A008482–A008484; A008485–A008486; A008487–A008488; A008489–A008491. In addition, the LDEQ provided public notice and an opportunity for public comment (as well as comments by EPA) in regard to the proposed post-closure care of the Old Silt Pond. A008492–A008493; A008494–A008495; A008496.

748. The Old Silt Pond response action has been conducted under applicable Louisiana state authorities and the oversight of the LDEQ, A008413–A008418, A008497–A008502; through the oversight of the LDEQ, the State of Louisiana commented upon, required modifications to, and ultimately approved of all work done in connection with the Old Silt Pond response. A008229–A008232; A008186–A008190; A008378–A008403; A008411; A008412; A008431–A008432; A008433–A008447; A008448; A008413–A008420.

749. Expert Stephen Johnson determined that the Old Silt Pond response involved required activities, and that Exxon had a clear reason and sound basis for this response. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 5–6, 8–15, 37–39. He therefore determined that the Old Silt Pond response activities were required, reasonable, and appropriate. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 5–6, 8–15, 37–39.

750. Expert Stephen Johnson also examined the extent and nature of Exxon's processes for planning and budgeting, analyzing alternatives, developing scopes of work, contracting, requiring change orders, establishing invoice requirements, reviewing invoices, checking costs against budgets, and revising budgets, to assess whether the costs of the Old Silt Pond response activities were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22, 39–40. Expert Johnson determined that the costs for the Old Silt Pond response activities were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22, 39–40.

751. Exxon's Old Silt Pond response action was a necessary response, was properly characterized as a "removal action" within the meaning of the relevant NCP, and was performed consistent with the NCP (or at least in substantial compliance with the NCP). Ex. 4, Att. C, S. Johnson 2016 Rpt. at 99–107. Based on these considerations, expert Johnson further has opined that the Old Silt Pond response action resulted in a CERCLA-quality cleanup or is in the process of doing so. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 107; Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 31–37.

3. Rice Paddy Landfarm

752. The LDEQ and Exxon determined that the four listed hazardous wastes present at the Old Silt Pond—API Separator Sludge (K051), Slop Oil Emulsion Solids (K049), Dissolved Air Flotation Float (K048), and Heat Exchanger Bundle Cleaning Sludge (K050)—were also managed at the Rice Paddy Landfarm. Ex. 12, Pisani Decl.; A008508. Exxon estimated that the Rice Paddy Landfarm contained 121,000 cubic yards of waste materials. A008527.

753. The LDEQ considered the Rice Paddy Landfarm area and the Shallow Fill Zone to be "interrelated," A008404–A008410, because the Rice Paddy Landfarm was constructed over the Shallow Fill Zone where there had been actual and potential hazardous substance releases to the underlying Shallow Fill Zone and groundwater. Ex. 12, Pisani Decl.; A008404–A008410; A008303–A008320. Given that the Rice Paddy Landfarm contained historical oily waste materials and lacked a liner system between the landfarm and the underlying fill materials and other environmentally-protective technical requirements, A008464–A008466, the LDEQ determined that the Rice Paddy Landfarm was an actual or potential source of releases of hazardous wastes and other contaminants to the underlying Shallow Fill Zone and groundwater, A008504–A008586, These conditions at the Rice Paddy Landfarm posed urgent actual and/or potential threats to human health or the environment. Ex. 12, Pisani Decl.

754. Exxon's Rice Paddy Landfarm response action was a necessary response to the releases and/or threats of releases of hazardous substances and threats to human health and the environment. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 109–10.

755. The LDEQ required Exxon to close the Rice Paddy Landfarm to eliminate or minimize actual or potential releases of hazardous substances from the Rice Paddy Landfarm to the underlying Shallow Fill Zone and groundwater. A008504-A008586. For example, as documented in the closure plan, one of the purposes of the closure was to "eliminate[] -- to the extent necessary to protect human health and the environment -- post-closure escape of hazardous waste, hazardous waste constituents, leachate, contaminated runoff, and waste decomposition products to the ground water, surface water or atmosphere." A008527; Ex. 12, Pisani Decl.

756. The response action for the Rice Paddy Landfarm area was approved by the LDEQ in January 1989, A008503, A008412, after the 1985 NCP took effect on February 18, 1986, Ex. 14, 1985 NCP, but before the 1990 NCP became effective on April 9, 1990. 1990 NCP, 55 Fed. Reg. at 8,666.

757. The Rice Paddy Landfarm response activities were intended as interim responses to the conditions identified in these areas, to abate or minimize an actual or potential release of hazardous substances that posed a threat to human health and the environment. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 102, 110.

758. The Rice Paddy Landfarm response was not intended to be a permanent, final remedy because it was intended only to prevent the migration of contamination into the environment. The Rice Paddy Landfarm overlies and contributes, or potentially contributes contamination to, the Shallow Fill Zone and the response activities for the Rice Paddy Landfarm are one component of the overall Shallow Fill Zone response. A008504-A008586; A008503; A008412. These response activities were intended to address only one source of contamination to the Shallow Fill Zone and groundwater receptors; they did not address other potential sources, such as, for example, the oily fill materials in the Shallow Fill Zone or dissolved phase hydrocarbons in the groundwater. A008351; A008389; A008504-A008586; A008503; A008412.

759. Under Sections 300.65(b)(2)(i), (iv), and (viii) of the 1985 NCP, a removal action is the appropriate response when site conditions involve: (a) actual or potential exposure to hazardous substances or pollutants or contaminants by nearby populations, animals, or the food chain; (b) high levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate; and/or (c) other situations or factors that may pose threats to public health or welfare or the environment. Ex. 14, 1985 NCP, 50 Fed. Reg. at 47,971.

760. The Rice Paddy Landfarm response action consisted primarily of the following LDEQ-required activities. First, Exxon prepared and submitted a report titled “Rice Paddy Landfarm RCRA Closure and Post-Closure Plan” to LDEQ in June 1988 that set forth both a proposed response action and contingent response action, in which the contingent response action would only be implemented if the proposed response action proved infeasible to address the actual or potential releases of hazardous substances from the Rice Paddy Landfarm. A008504–A008586. LDEQ approved the proposed and contingent response actions on January 12, 1989. A008587; A008588. Pursuant to the approved plan, Exxon began to perform active degradation of the petroleum constituents in the waste materials and soils in the Rice Paddy Landfarm until the oil content of the materials reached less than one percent by weight of the soil. Concurrently, and also pursuant to the plan, Exxon conducted a subsurface investigation whose purpose was to determine if hazardous substances were present in the underlying contaminated fill materials below the proposed treatment zone for the active degradation cleanup. A008589–A008605. It was necessary to determine if the underlying historical fill materials contained contamination because if the underlying fill materials were contaminated, then it would neither be possible to define a treatment zone under which no contamination existed, nor to achieve the desired target level of “one percent” of oil content in the Rice Paddy Landfarm. A008528; A008534. In the event there was contamination in the underlying fill materials, Exxon was required to cease performing the primary response action due to infeasibility and to perform the contingent response action that involved the installation of a RCRA cap over the Rice Paddy Landfarm area in order to contain the underlying waste and contaminated fill materials, which was much more expensive than the original response action would have been. Ex. 12, Pisani Decl.; A008542. The subsurface investigation did determine

the existence of contamination in the underlying historical fill materials, and therefore, Exxon requested that LDEQ approve implementation of the contingent response action, A008589–A008605, which LDEQ approved in December 1990. A008469–A008470. As required by the LDEQ-approved closure and post-closure plan, Exxon installed the RCRA cap over the Rice Paddy Landfarm area, and submitted a closure certification report to LDEQ in August 1994. A008471–A008478. As "lead agency," LDEQ accepted the closure certification on January 19, 1995. A008448. Exxon continues to conduct post-closure care, which primarily consists of operation and maintenance of the RCRA cap. A008449–A008456.

761. Exxon conducted its response action for the Rice Paddy Landfarm area in response to the LDEQ's determination that interim activities were required. The LDEQ reviewed a preliminary assessment—the "RFA/VSI" regarding the Old Silt Pond and Rice Paddy Landfarm, A008457–A008466, a site investigation of the Shallow Fill Zone—titled "Shallow Fill Zone Hydrogeologic Investigation," A008217–A008228, and other site conditions to determine that a removal action was appropriate. These reports informed LDEQ that the Rice Paddy Landfarm and the underlying landfill contained hazardous substances but lacked a liner system and other environmentally-protective technical requirements, that the Rice Paddy Landfarm was an actual or potential source of contamination to the underlying Shallow Fill Zone and groundwater, and therefore, LDEQ determined that a closure/removal action was appropriate, and then required Exxon to promptly implement certain component activities at the Rice Paddy Landfarm. A008411; A008504–A008586; A008412.

762. Exxon required its environmental contractors involved in the Rice Paddy Landfarm response activities to comply with the company's established and written occupational safety and health program and requirements, and furthermore, in many cases the environmental contractors conducting the work also had their own occupational safety and health plans that they complied with. A008348–A008353.

763. Exxon prepared and maintained necessary documentation regarding the nature of the Rice Paddy Landfarm response activities. A008504–A008586; A008411; A008431–A008432; A008448; A008413–A008418; A008467–A008468; A008469–A008470; A008471–A008478; A008497–A008502.

764. Exxon identified and complied with ARARs for the Rice Paddy Landfarm response activities, as confirmed by LDEQ's oversight of these response activities and approval of closure certification. A008411; A008504–A008586; A008467–A008468; A008469–A008470; A008471–A008478; A008497–A008502.

765. An expert witness for the Government, Alborz Wozniak, has stated that "Exxon's actions related to the . . . [Rice Paddy Landfarm] included appropriate evaluation of action limits for the time and therefore were consistent with the NCP requirement for consideration of ARARs." Ex. 18, Wozniak 2017 Rpt. at 106.

766. In 1988, the LDEQ provided public notice and the opportunity for public comments regarding the proposed Rice Paddy Landfarm response action and contingent response action, but no comments were received. A008479; A008480–A008481; A008588. In addition, the LDEQ provided public notice and an opportunity for public comment in regard to

the proposed post-closure care of the Rice Paddy Landfarm. A008606–A008607; A008608–A008609.

767. The Rice Paddy Landfarm response action has been conducted under applicable Louisiana state authorities and the oversight of the LDEQ, A008497–A008502; through the oversight of the LDEQ, the State of Louisiana commented upon, required modifications to, and ultimately approved of all work done in connection with the Rice Paddy Landfarm responses. A008229–A008232; A008186–A008190; A008411; A003244–A003245; A008431–A008432.

768. Expert Stephen Johnson determined that the response involved required activities and that Exxon had a clear reason and sound basis for these activities. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 5–6, 8–15, 37–39. He therefore determined that the response activities were required, reasonable, and appropriate. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 5–6, 8–15, 37–39.

769. Expert Stephen Johnson also examined the extent and nature of Exxon's processes for planning and budgeting, analyzing alternatives, developing scopes of work, contracting, requiring change orders, establishing invoice requirements, reviewing invoices, checking costs against budgets, and revising budgets, to assess whether the costs of the Rice Paddy Landfarm response activities were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22, 39–40. Expert Johnson determined that the costs for the response activities were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22, 39–40.

770. Exxon's Rice Paddy Landfarm response action was a necessary response, was properly characterized as a "removal action" within the meaning of the relevant NCP, and was performed consistent with the NCP (or at least in substantial compliance with the NCP). Ex. 4, Att. C, S. Johnson 2016 Rpt. at 107–15; *see also* Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 76–85. Based on these considerations, expert Johnson further has opined that the response action resulted in a CERCLA-quality cleanup or is in the process of doing so. Ex. 4, Att. C, S. Johnson 2016 Rpt. at 115; Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 31–37.

4. SWMU Investigations

771. In the mid-1990s, the LDEQ required Exxon to conduct an RFI at the Baton Rouge Facility for a number of SWMUs that had been identified during a prior 1987 EPA-led RCRA Facility Assessment and Visual Site Inspection. *See, e.g.*, A008610–A008999; A009462–A009513; A009000–A009023; A009024–A009394. Included among the SWMUs investigated at the Baton Rouge Facility were the API Oil/Water Separators (SWMU 19), the Propane Storage Area Landfill (SWMU 28), and the North Batture Burning Pit and Landfill (SWMU 33). A009000–A009023.

772. Sampling data collected for the soils and/or groundwater at these SWMUs confirmed the presence of hazardous substances that were released and/or posed a threat of release. A009009–A009011; A009013; A009021–A009023. For example, hazardous substances were detected in soil in excess of the Louisiana Department of Environmental Quality's ("LDEQ") risk-based soil standards for benzene, benzo(a)pyrene and naphthalene at the API Oil/Water Separators (SWMU 19), and for benzene, benzo(a)anthracene and naphthalene at the North Batture Burning Pit and Landfill (SWMU 33). A009000–A009023.

In addition, hazardous substances were detected in groundwater in excess of the LDEQ risk-based standards for benzene, benzo(a)anthracene, benzo(a)pyrene, chrysene, arsenic, lead, mercury and vanadium at the API Oil/Water Separators (SWMU 19), vanadium at the Propane Storage Area Landfill (SWMU 28), and arsenic, lead, mercury, nickel, antimony and vanadium at the North Batture Burning Pit and Landfill (SWMU 33). A009010–A009011.

773. Exxon also has conducted environmental investigations regarding the Maryland Tank Farm to determine if removal activities were necessary at this tank farm. A009395–A009401.

774. An expert witness for Exxon has referred to Exxon's environmental investigation activities for the RFI SWMUs and the Maryland Tank Farm collectively as the "SWMU Investigations" at the Baton Rouge Facility. Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 85–90. Exxon's SWMU Investigation response action was a necessary response to the releases and/or threats of releases of hazardous substances and threats to human health and the environment.

775. The CERCLA statute defines "removal" actions to include actions taken "to monitor, assess, and evaluate the release or threat of release of hazardous substances." 42 U.S.C. § 9601(23) (CERCLA definition of "remove" or "removal"). Exxon's SWMU Investigation response activities have included activities to monitor, assess and evaluate the release and/or potential release of hazardous substances at various units at the Baton Rouge Facility. A008610–A008999; A009462–A009513; A009000–A009023; A009024–A009394; A009395–A009401; A009402–A009444. In addition, according to expert Stephen Johnson, "if what you're ultimately getting to is my view on how - how do you classify investigation work under the removal/remedial distinction, then I think ... that investigation work is considered a removal action where you have to pick one of those two." A005043; A008229–A008232; A008186–A008190.

776. Exxon required its environmental contractors involved with the Baton Rouge SWMU Investigation response action to comply with the company's established and written occupational safety and health program and requirements, and in many cases these contractors conducting the work also had their own occupational safety and health plan that they complied with. A009462–A009513; A009395–A009401; A009402–A009444; A009445–A009461; A009462–A009513.

777. Exxon's SWMU Investigation activities followed the applicable technical elements for environmental investigations and involved the assessment of environmental media impacted by hazardous substances at each of the relevant SWMUs. Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 87–88; Ex. 18, Wozniak 2017 Rpt. at 41–44, 46–47. These activities also were performed with appropriate sampling and analysis plans and quality assurance/quality control procedures. A009462–A009513; A009395–A009401; A009402–A009444; A009445–A009461; A009462–A009513.

778. Exxon prepared and maintained necessary documentation regarding the nature of the SWMU Investigation response activities. A009445–A009461; A009462–A009513.

779. An expert witness for the Government, Alborz Wozniak, has stated that based on his review of the available records "Exxon's actions at the MTF [Maryland Tank Farm] were performed in a manner generally consistent with the applicable steps in the 1990 NCP regulations." Ex. 18, Wozniak 2017 Rpt. at 112. Mr. Wozniak also concluded that in his opinion "Exxon's actions related to the Other SWMUs [SWMUs 19, 28 and 33] included appropriate evaluation of regulatory standards and action limits and therefore were consistent with the NCP requirement for consideration of ARARs." Ex. 18, Wozniak 2017 Rpt. at 108. He similarly found that "Exxon's actions related to the MTF [Maryland Tank Farm] included appropriate evaluation of regulatory standards and action limits and therefore were consistent with the NCP requirement for consideration of ARARs." Ex. 18, Wozniak 2017 Rpt. at 112.

780. The SWMU Investigation response activities have been conducted under applicable Louisiana state authorities and the oversight of the LDEQ. A008229–A008232; A008186–A008190; A008299–A008302; A008299–A008302; A008370–A008377.

781. Expert Stephen Johnson determined that the SWMU Investigation response action involved required activities and that Exxon had a clear reason and sound basis for this response. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 5–6, 8–15. He therefore determined that this response was required, reasonable, and appropriate. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 5–6, 8–15.

782. Expert Stephen Johnson also examined the extent and nature of Exxon's processes for planning and budgeting, analyzing alternatives, developing scopes of work, contracting, requiring change orders, establishing invoice requirements, reviewing invoices, checking costs against budgets, and revising budgets, to assess whether the costs of the SWMU Investigation response action were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22. Expert Johnson determined that the costs for the SWMU Investigation were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22.

783. Exxon's SWMU Investigation response action was a necessary response, was properly characterized as a "removal action" within the meaning of the relevant NCP, and was performed consistent with the NCP (or at least in substantial compliance with the NCP). Ex. 4, Att. C, S. Johnson 2016 Rpt. at 115–17. Based on these considerations, expert Johnson further has opined that the SWMU Investigation resulted in a CERCLA-quality cleanup or is in the process of doing so. Ex. 4, Att. D, S. Johnson 2017 Rebuttal Rpt. at 31–37.

VIII. <u>Exxon's Costs Related to Wartime Units and Areas of Contamination</u>

A. Summary of Costs Related to Baytown

784. Exxon has incurred over $51 million in past response costs at the Baytown Site through December 31, 2014 and additional past costs since that date. Exxon will incur ongoing and future costs. *See* Ex. 3, Att. D, Ficca 2017 Supp. Rpt., Attachment 3, Schedule B-1.

785. Exxon originally submitted its written demand to the U.S. Department of Justice for payment of response costs incurred or to be incurred at the Baytown Site on July 15, 2004, and therefore, Exxon is entitled to interest of approximately $8.6 million based on the $51 million expenditure (through December 2014) and an effective interest date of July 15, 2004

(for costs incurred prior to July 15, 2004) or the invoice month plus 31 days (for costs incurred after July 15, 2004). This interest is calculated through August 31, 2016. *See* Ex. 3, Att. D, Ficca 2017 Supp. Rpt., Attachment 3, Schedule B-3. This interest calculation is also based on the Superfund Interest Rate as set forth by EPA at https://www.epa.gov/superfund/superfund-interest-rates.

786. As of 2014, Exxon anticipated incurring approximately $2.5 million in future, run-rate costs per year for the ongoing response actions described in Section VII. A., *supra*, at the Baytown Site. From 2015 to 2017, this was an accurate approximation of Exxon's annual costs related to those known response actions. As of 2017, the run-rate estimate was revised for the next five years to be $2.0 million per year. Accordingly, Exxon's projected future ran-rate costs for the 2015 to 2019 period is $11.5 for ongoing, known future response actions, including approximately $7.5 million spent from 2015 to 2017. *See* Ex. 3, Att. D, Ficca 2017 Supp. Rpt., Attachment 3, Schedule A-1; *see also* Ex. 3, Att. B, Ficca 2016 Rpt. at 4; Ex. 10, Parades Decl.

787. Exxon has also incurred approximately $125,000 in recoverable consultant investigation costs related to the Baytown Site. *See* Ex. 3, Att. D, Ficca 2017 Supp. Rpt., Attachment 3, Schedule A-1; *see also* Ex. 3, Att. B, Ficca 2016 Rpt. at 4.

788. Exxon's total cleanup costs related to units with a wartime nexus at the Baytown Site, not including attorneys' fees or other future costs, can therefore currently be tabulated as follows, for a total of over $72 million:

Past Costs Incurred through December 2014	$	51,048,743.00
Interest through August 2016	$	8,568,010.00
Five-Year "Run Rate" Costs (2015-2019)	$	11,500,000.00[32]
Recoverable Consultant Investigation Costs	$	125,000.00
Total	**$**	**71,241,753.00**

Ex. 3, Att. D, Ficca 2017 Supp. Rpt., Attachment 3, Schedule A-1.

789. Exxon's past costs incurred through December 2014 can be further broken down by Baytown cleanup unit as follows:

[32] As of 2014, the annual future, run-rate costs were projected to be approximately $2.5 million per year. As of this month, these projections have been revised for 2018 forward to be $2.0 million per year. Accordingly, Exxon has revised its five-year, run-rate costs total for the 2015 to 2019 period from $12,500,000 to $11,500,000 based on the updated information related to 2018 and 2019. *See* Ex. 10, Paredes Decl.

Separator 3M and Separator 10 Cleanup	$ 4,388,559
South Landfarm Cleanup	$ 1,589,618
General Canals and Separators Cleanup	$ 10,536,486
Investigation of SWMUs	$ 4,949,390
Refinery Groundwater	$ 7,866,655
SWMU 62 / Main Office Building (MOB)	$ 103,536
Facility Operating Areas (FOA)	$ 8,056,656
Mitchell Point - SWMU 60	$ 6,274,383
Former Ordnance Works Site Cleanup	$ 5,481,340
Velasco Street Ditch	$ 1,802,120
Total	**$ 51,048,743**

Ex. 3, Att. D, Ficca 2017 Supp. Rpt., Attachment 3, Schedule B-1.

790. In addition to the past and five-year "run-rate" costs described above, Exxon also expects to incur future costs related to additional cleanup activities at the Baytown Site, including approximately $11 million to $13 million for Mitchell Bay and up to $12 million for SWMU 47 (Waste Clay Pile). Ex. 3, Att. B, Ficca 2016 Rpt. at 43; A009514–A009525; Ex. 10, Paredes Decl.

B. Summary of Costs Related to Baton Rouge

791. Exxon has incurred over $26 million in past response costs at the Baton Rouge through December 31, 2014 and additional past costs since that date. Exxon will incur ongoing and future costs. *See* Ex. 3, Att. D, Ficca 2017 Supp. Rpt., Attachment 3, Schedule C-1.

792. Exxon originally submitted its written demand to the U.S. Department of Justice for payment of response costs incurred or to be incurred at the Baton Rouge Site on January 6, 2010, and therefore, Exxon is entitled to interest of approximately $1.6 million based on the $26 million expenditure and an effective interest date of January 6, 2010 (for costs incurred prior to January 6, 2010) or the invoice month plus 31 days (for costs incurred after January 6, 2010). This interest is calculated through August 31, 2016. *See* Ex. 3, Att. D, Ficca 2017 Supp. Rpt., Attachment 3, Schedule C-2. This interest calculation is also based on the Superfund Interest Rate as set forth by EPA at https://www.epa.gov/superfund/superfund-interest-rates.

793. Exxon anticipates incurring approximately $250,000 in future costs per year, such that its five-year future run-rate costs at the Baton Rouge Site are projected to be $1.25 million for ongoing, known future response actions. See Ex. 3, Att. D, Ficca 2017 Supp. Rpt., Attachment 3, Schedule A-1; see also Ex. 3, Att. B, Ficca 2016 Rpt. at 5.

794. Exxon has also incurred approximately $125,000 in recoverable consultant investigation costs related to the Baton Rouge Site. *See* Ex. 3, Att. D, Ficca 2017 Supp. Rpt., Attachment 3, Schedule A-1; *see also* Ex. 3, Att. B, Ficca 2016 Rpt. at 5.

795. Exxon's total cleanup costs related to units with a wartime nexus at the Baton Rouge Site, not including attorneys' fees or other future costs, can therefore currently be tabulated as follows, for a total of almost $29 million:

Past Costs Incurred through December 2014	$	26,046,130.00
Interest through August 2016	$	1,563,684.00
Five-Year "Run Rate" Costs (2015-2019)	$	1,250,000.00
Recoverable Consultant Investigation Costs	$	125,000.00
Total	**$**	**28,984,814.00**

Ex. 3, Att. D, Ficca 2017 Supp. Rpt., Attachment 3, Schedule A-1.

796. Exxon's past costs incurred through December 2014 can be further broken down by Baton Rouge cleanup unit as follows:

Old Silt Pond	$ 9,977,687
Old Silt Pond/Rice Paddy Landfarm	$ 3,302,781
Rice Paddy Landfarm	$ 4,622,578
SWMU Investigation & Remediation	$ 2,762,561
Shallow Fill Zone	$ 5,380,522
Total	**$ 26,046,130**

Ex. 3, Att. D, Ficca 2017 Supp. Rpt., Attachment 3, Schedule C-1.

797. Expert witness Stephen Johnson evaluated whether Exxon's claimed response action costs at the Baytown and Baton Rouge Sites were reasonable. In evaluating these costs, he evaluated three different aspects of Exxon's operations and response actions. First, he examined the company's cost management and control processes to assess the degree to which they enabled Exxon to control and limit its expenditures for response costs. Second, he evaluated whether the actual costs Exxon was charged and paid for a variety of work was consistent with the costs for similar work paid for by industry. Third, he evaluated the cost-effectiveness of Exxon's response actions. Expert Johnson determined that Exxon's claimed response action costs at the Baytown and Baton Rouge Sites were reasonable. Ex. 4, Att. B, S. Johnson 2014 Rpt. at 6, 16–22.

C. Evidence Supporting Costs at Baytown and Baton Rouge

798. The costs summarized in Sections VIII. A. and B. above are based on an extensive review of available cost records by cost accounting expert Paul S. Ficca of FTI, who was retained by Exxon and who has extensive experience in the calculation and quantification of costs and damages. *See* Ex. 3, Att. B, Ficca 2016 Rpt. at 3–6 (total cost amounts subsequently updated by Ex. 3, Att. C, Ficca 2016 Rebuttal Rpt. and Ex. 3, Att. D, Ficca 2017 Supp. Rpt.).

799. Specifically, expert Ficca reviewed "invoices, check copies, check registers, accounting records, cleanup documents, cost summaries, and other [cost documents]," and also interviewed Exxon personnel before concluding that Exxon had incurred approximately $51 million in past costs related to units with a wartime nexus at Baytown and approximately $26 million in past costs related to units with a wartime nexus at Baton Rouge. *See* Ex. 3, Att. B, Ficca 2016 Rpt. at 12.

800. A. J. Gravel, another FTI employee, assisted in the compilation of the documentation expert Ficca reviewed, including the invoices and payables records, with the assistance of Exxon personnel, such as Karen Payton. *See* A009529–A009530; A009533–A009535; A009536–A009537.

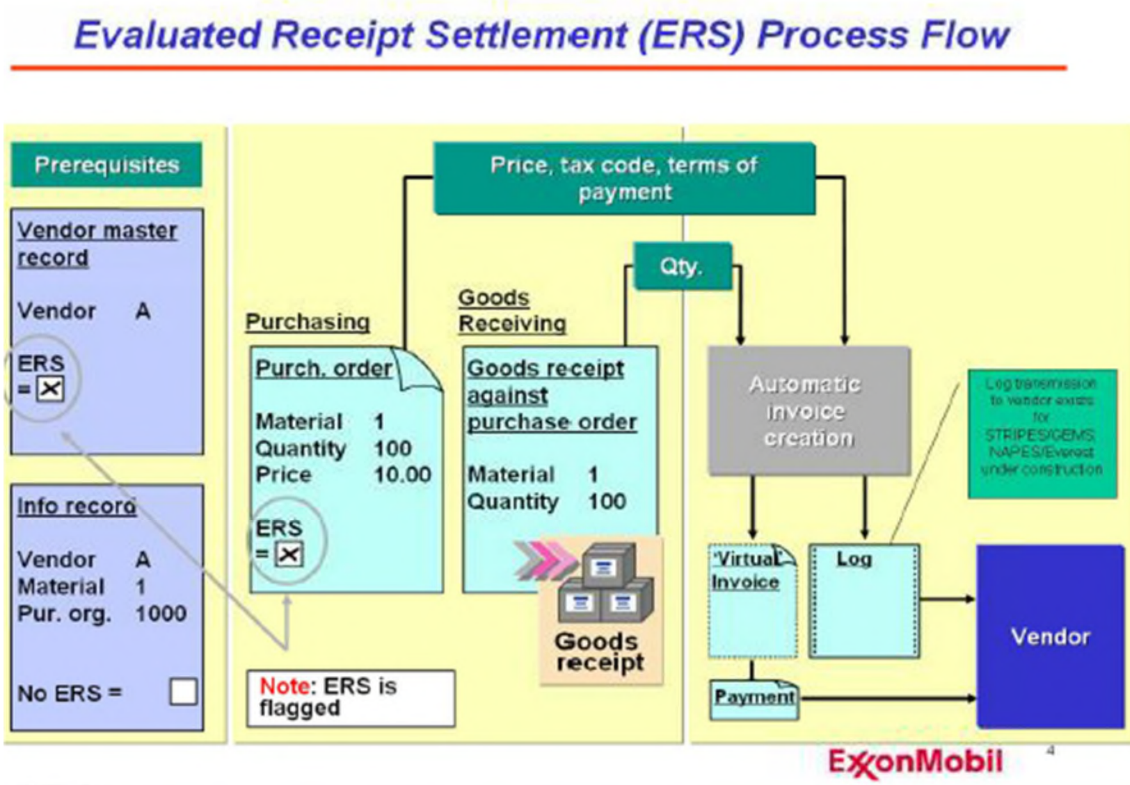
801. "Proof of payment" or "payables" records reviewed could include "canceled checks, copies of canceled checks, electronic confirmation of payments, like wire transfer confirmations, payables, registers, [or] payables reports[.]" *See* A009531–A009532.

802. "Invoice records" reviewed could include both paper invoices as well as records related to electronic invoicing, such as Exxon's Evaluated Receipt Settlement ("ERS") program. *See* A009532.

803. According to Exxon internal documentation, "ERS is a procedure for paying a supplier for materials without receiving a paper invoice." Ex. 3, Att. D, Ficca 2017 Supp. Rpt., Exhibit A at 3; *see also* A009539.

804. Under the ERS system, instead of the contractor generating an external invoice "[a]n internal invoice . . . is generated for the amount shown on the Purchase Order when the Good Receipt . . . is posted[.]" Ex. 3, Att. D, Ficca 2017 Supp. Rpt., Exhibit A at 3.

805. The following diagram illustrates the procedure identified in PF ¶¶ 802–03:



Ex. 3, Att. D, Ficca 2017 Supp. Rpt., Exhibit A at 4.

806. According to fact witness A. J. Gravel, "if no paper invoice exist[s], an [ERS record] would serve as an invoice" because "it's got much of the information that you would see on an invoice. It's got the [general ledger] code, the vendor code which gives you the vendor name, the company code, it has the invoice number, invoice clearing number, the amount, the discount base." A009538.

807. The accounting records expert Ficca reviewed were produced from internal accounting systems that Exxon relied on to "account for costs and payments made and to store related documentation." Ex. 3, Att. B, Ficca 2016 Rpt. at 13; *see also* A009540–A009544 (Exxon payables employee discusses using these accounting systems).

808. Exxon has utilized several different accounting systems from 1985 to the present. These accounting systems are as follows:

a. Prior to 1997, Exxon employed a Unified Financial System ("UFS"), which was a mainframe accounting system that tracked payables and accounting data.

b. From 1997 to 2001, Exxon employed the Alpha SAP System.

c. From 2001 to 2011, Exxon employed the Everest SAP System (Alpha had merged into Everest).

d. Beginning in 2010, Exxon began transitioning to the North American Stripes accounting system, which is another SAP-based accounting system.

Ex. 3, Att. B, Ficca 2016 Rpt. at 13.

809. The accounting systems generated accounting records that typically show the invoice amount, invoice date, payment date, and project number or accounting code, and also frequently provide check number and vendor information. *See, e.g.*, A009545–A009559.

810. The accounting records related to the Baytown Site typically contained "project codes" that related to specific cleanups or cleanup phases. Accordingly, expert Ficca was able to use these project codes to identify which costs in the accounting records were related to the cleanup units with a wartime nexus Ex. 3, Att. B, Ficca 2016 Rpt. at 14, 17; *see also* Ex. 4, Att. B, S. Johnson 2014 Rpt. at 19.

811. The accounting records related to the Baton Rouge Site typically contained "cost centers." Many "cost centers" did include response costs related to units with a wartime units as well as other, non-recoverable costs. Expert Ficca worked with Exxon personnel and also reviewed vendor invoices, scopes of work, and other cleanup related documents to identify which specific costs in a given "cost center" were response costs related to units with a wartime nexus. Ex. 3, Att. B, Ficca 2016 Rpt. at 14; *see also* Ex. 4, Att. B, S. Johnson 2014 Rpt. at 19.

812. Fact witness A. J. Gravel also testified that he worked with Exxon employees, including Ronald Broussard and Tim Tucker, to determine which costs in a Baton Rouge cost center were recoverable. A009560–A009568.

813. Expert Ficca reviewed the accounting records described in PF ¶¶ 798–811 to provide one level of substantiation for the costs incurred at Baytown and Baton Rouge because he concluded, after his review of the accounting records, that Exxon's internal accounting systems are reliable. Ex. 3, Att. B, Ficca 2016 Rpt. at 13–14.

814. To test the reliability of the accounting records, expert Ficca compared the accounting records to available invoices and proof of payment records and found no unexplained discrepancies. Ex. 3, Att. B, Ficca 2016 Rpt. at 14.

815. Exxon's accounting is also subject to regulation by various governmental bodies, including the Securities and Exchange Commission ("SEC") and the Federal Trade Commission ("FTC"). Ex. 3, Att. B, Ficca 2016 Rpt. at 16; *see also* https://www.ftc.gov/about-ftc/what-we-do/enforcement-authority (providing a summary of the FTC's investigative and law enforcement authority); https://www.sec.gov/cgi-bin/browse-edgar?action=getcompany&CIK=0000034088&owner=exclude&count=40 (showing all available online filings by Exxon to the SEC).

816. To meet its regulatory compliance obligations, Exxon is audited annually by PricewaterhouseCoopers ("PWC")—for every year since at least 1993, PWC has concluded that "ExxonMobil's financial reporting was in conformity with generally accepted accounting principles and that ExxonMobil maintained effective internal control over its financial

reporting." Ex. 3, Att. B, Ficca 2016 Rpt. at 15; *see also* Form 10-K Annual Report for Exxon at p. 64 (2016), available at https://www.sec.gov/Archives/edgar/data/34088/000003408817000017/xom10k2016.htm.

817. Exxon's management has similarly concluded annually that Exxon's "internal control over financial reporting" is effective. *See, e.g.*, Form 10-K Annual Report for Exxon at p. 62 (2016), available at https://www.sec.gov/Archives/edgar/data/34088/000003408817000017/xom10k2016.htm.

818. Exxon conducted assessments of its invoicing process to ensure, among other things, that there were controls in place to make sure invoices were posted to the right codes. Controls included review by multiple Exxon employees. A009569–A009574.

819. Similarly, fact witness Leonard M. Racioppi, who is a Development Area Manager for Manufacturing and Superfund for Exxon, testified that all project engineers were "specifically trained to require an invoice before authorizing payment" in order to ensure that the invoice was acceptable and "met the contract requirements and cost structure." A009575–A009578.

820. Fact witness Gary D. Robbins, who is an Environmental Specialist for Exxon and who worked on various response activities at the Baytown Site, testified that after a contract was awarded:

> The contractor would invoice us with the appropriate backup documentation. The invoice verification is a two-step process. There's a verification that the services were received and then there was an approval for payment, a check was delivered to the contractor after the invoice was appropriately verified, and then the costs were stewarded, managed[,] reported, accounted for to make sure they were within the budgetary restrictions.
>
> A009579–A009581.

821. Expert Stephen Johnson similarly concluded that "[t]he invoice review and approval process was one of Exxon's most important cost control mechanisms" and that every invoice was "subject to two levels of review." "This invoice review and approval process ensured that Exxon did not pay more than what was negotiated in the contracting process and otherwise appropriate." Ex. 4, Att. B, S. Johnson 2014 Rpt. at 19–20.

822. Exxon also previously compiled cost records related to response actions at the Baytown and Baton Rouge Sites as part of the North American Coverage Case ("NACC"). In the mid-1990s Exxon sued some of its insurance carriers for costs incurred at thousands of sites across the company, including the Baytown and Baton Rouge Sites. Ex. 3, Att. B, Ficca 2016 Rpt. at 13.

823. Similar to the other accounting records, the NACC records typically show invoice amount, invoice date, and project number. *See, e.g.*, Ex. 3, Att. D, Ficca 2017 Supp. Rpt., Exhibit C.

824. In some instances, where UFS, Alpha, Everest, or Stripes data was unavailable, Mr. Ficca relied on NACC cost records to "provide one level of substantiation for investigation and response costs." Ex. 3, Att. B, Ficca 2016 Rpt. at 13.

825. According to expert Ficca, "[t]hese NACC cost records have been examined against available concurrent Exxon accounting records, invoices, and proof of payment and accurately reflect those costs incurred and paid for environmental cleanup at Baytown and Baton Rouge." Ex. 3, Att. B, Ficca 2016 Rpt. at 13.

826. A Government's expert witness—E. J. Janik—concurred that the information in the NACC database "appears to be accurate." A009582–A009585.

827. In addition to accounting records, expert Ficca reviewed available invoices, proof of payment records, and other documents to provide further substantiation of Exxon's response costs at Baytown and Baton Rouge. Ex. 3, Att. B, Ficca 2016 Rpt. at 12; *see also* Ex. 3, Att. D, Ficca 2017 Supp. Rpt. at 6–7.

828. Expert Ficca also reviewed the cleanup documentation described in Section VII above to confirm that the cleanup work associated with the claimed costs in fact occurred. Ex. 3, Att. B, Ficca 2016 Rpt. at 20–43.

829. Of the approximately $51 million in claimed costs related to the Baytown Site, 82% (approximately $41.7 million) is supported by an invoice, proof of payment record, and accounting record. Ex. 3, Att. D, Ficca 2017 Supp. Rpt. at 7; *see also* Figure 3, Cost Documentation Chart.

830. An additional 9% (approximately $4.6 million) of the claimed past costs totaling $51 million related to the Baytown Site is supported by an accounting record and either an invoice or a proof of payment record. Ex. 3, Att. D, Ficca 2017 Supp. Rpt. at 7; *see also* Figure 3, Cost Documentation Chart.

831. The remaining 9% (approximately $4.7 million) of the claimed past costs totaling $51 million related to the Baytown Site are supported by an accounting record. Ex. 3, Att. D, Ficca 2017 Supp. Rpt. at 7; *see also* Figure 3, Cost Documentation Chart.

832. A complete, detailed compilation of the cost information available for each cost item related to the Baytown Site is included in Ex. 3, Att. D, Ficca 2017 Supp. Rpt., Attachment 3, Schedules B-2 and B-3. This compilation summarizes all available data for each cost item (e.g., invoice number, payment date, cost code, etc.).

833. Of the approximately $26 million in claimed costs related to the Baton Rouge Site, 80% (approximately $20.8 million) is supported by an invoice, proof of payment record, and accounting record. Ex. 3, Att. D, Ficca 2017 Supp. Rpt. at 7; *see also* Figure 3, Cost Documentation Chart.

834. An additional 9% (approximately $2.5 million) of the claimed past costs totaling $26 million related to the Baton Rouge Site is supported by an accounting record and either an

invoice or a proof of payment record. Ex. 3, Att. D, Ficca 2017 Supp. Rpt. at 7; *see also* Figure 3, Cost Documentation Chart.

835. The remaining 11% (approximately $2.8 million) of the claimed past costs totaling $26 million related to the Baton Rouge Site are supported by an accounting record. Ex. 3, Att. D, Ficca 2017 Supp. Rpt. at 7; *see also* Figure 3, Cost Documentation Chart.

836. A complete, detailed compilation of the cost information available for each cost item related to the Baton Rouge Site is included in (1) Ex. 3, Att. D, Ficca 2017 Supp. Rpt., Attachment 3, Schedules C-2(a) and (e); and (2) Ex. 3, Att. C, Ficca 2016 Rebuttal Rpt., Attachment 3, Schedules C-2(b), (c), and (d). This compilation summarizes all available data for each cost item (e.g., invoice number, payment date, cost center, etc.).

Date: December 15, 2017

Respectfully submitted,

/s/ Daniel M. Steinway
Daniel M. Steinway (S.D. Tex. No. 1105349) - Attorney in Charge
Tynan Buthod (S.D. Tex. No. 14036)
Michael McGovern (S.D. Tex. No. 1095459)
BAKER BOTTS L.L.P.
The Warner
1299 Pennsylvania Avenue, N.W.
Washington, D.C. 20004-2400
Tel.: (202) 639-7700
Fax: (202) 639-7980
michael.mcgovern@bakerbotts.com

Counsel for Exxon Mobil Corporation

CERTIFICATE OF SERVICE

I hereby certify that on the 15th day of December 2017 I served the foregoing on the following counsel by filing the same via the Court's ECF system:

Michael D. Rowe, Esq.
United States Department of Justice
Environment Division
Environmental Defense Section
601 D Street, N.W., Room 8110
Washington, D.C. 20004
michael.rowe@usdoj.gov

Justin D. Heminger, Esq.
United States Department of Justice
Environment Division
Environmental Defense Section
601 D Street, N.W., Room 8110
Washington, D.C. 20004
justin.heminger@usdoj.gov

Stephanie J. Talbert
United States Department of Justice
Environment Division
Environmental Defense Section
601 D Street, N.W., Room 8110
Washington, D.C. 20004
stephanie.talbert@usdoj.gov

Brian H. Lynk
United States Department of Justice
Environment Division
Environmental Defense Section
601 D Street, N.W., Room 8110
Washington, D.C. 20004
brian.lynk@usdoj.gov

Erica Zilioli
United States Department of Justice
Environment Division
Environmental Defense Section
601 D Street, N.W., Room 8110
Washington, D.C. 20004
erica.zilioli@usdoj.gov

/s/ Michael McGovern
Daniel M. Steinway (S.D. Tex. No. 1105349) - Attorney in Charge
Tynan Buthod (S.D. Tex. No. 14036)
Michael McGovern (S.D. Tex. No. 1095459)
BAKER BOTTS L.L.P.
The Warner
1299 Pennsylvania Avenue, N.W.
Washington, D.C. 20004-2400
Tel.: (202) 639-7700
Fax: (202) 639-7980
michael.mcgovern@bakerbotts.com

Counsel for Exxon Mobil Corporation